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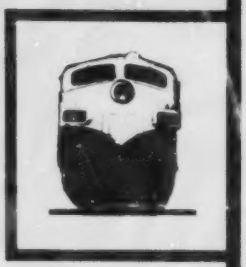

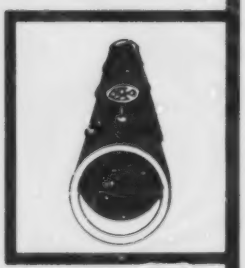

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NATIONAL TRANSPORTATION SAFETY BOARD

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WASHINGTON, D.C. 20594

ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA

U.S. GENERAL AVIATION CALENDAR YEAR 1980

NTSB/ARG-84/01

UNITED STATES GOVERNMENT

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16. Abstract

This publication presents the record of general aviation accidents for calendar year 1980. Accidents involving revenue operations of Commuter Air Carriers and On Demand Air Taxis are reported in the "Annual Review of Aircraft Accident Data - U.S. Air Carriers - Calendar Year 1980". In 1979 and prior years, such accidents were reported in annual reviews of general aviation accidents.

The report begins with a section providing statistics which describe the 3,597 general aviation accidents which occurred in 1980. Next are eight sections which report on subsets of the accidents defined by the type of aircraft involved. The final six sections contain statistics on subsets defined by the kind of flying involved (e.g., personal, business, instruction).

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				Recipr. Engine												
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INTRODUCTION

This report presents a statistical compilation and review of general aviation accidents which occurred in 1980. The accidents reported are all those involving U.S. registered aircraft not conducting air carrier revenue operations under 14 CFR 121, 14 CFR 127, or 14 CFR 135.

Accident data upon which this review is based have been extracted from the Safety Board's automated Aviation Accident Data System. Flight hour estimates used for computing accident rates were estimated using data published by the Federal Aviation Administration.

This report is divided into sections, each of which (except for the "All Operations" section) presents a review of some subset of all general aviation accidents. Each subset represents aircraft of similar types or aircraft being operated for particular purposes.

In general, each section begins with an overview of accidents and their consequences for 1980 and for each of the two preceding years. Several tables then present accident parameters for 1980 only. Concluding each section are tabulations which present comparative statistics for 1980 and for the five-year period 1975-1979.

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ALL OPERATIONS

In 1980, there were a total of 3,597 accidents involving U.S. registered general aviation aircraft in the United States and its territories. Sixty-two of these aircraft were involved in collisions (in the air or on the ground) with other U.S. general aviation aircraft, bringing the number of aircraft involved in these accidents to 3,628 (a collision between aircraft is counted as one accident for the purposes of this report).

SUMMARY OF LOSSES

In Table 1, general aviation accidents are summarized for 1980 and the two prior years in terms of the maximum degree of injury involved, the number of fatalities, and the degree of aircraft damage. The number of accidents in 1980 was down by six percent from 1979 and almost 15 percent lower than the figure for 1978. Although there were fewer fatal accidents in 1980 than in 1979, the number of fatalities was up by 15.

Table 1 - SUMMARY OF LOSSES
ALL OPERATIONS
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	622	638	721
Involved Serious Injury	400	374	427
Involved Minor Injury	514	572	630
Involved No Injury	2061	2241	2440
Total	3597	3825	4218
Fatalities			
Passenger	598	567	657
Crew	645	651	743
Other Persons	9	19	158
Total	1252	1237	1558
Aircraft Damaged*			
Destroyed	1019	998	1118
Substantial	2577	2811	3111
Minor	12	28	27
None	20	21	17
Total	3628	3858	4273
Accident Rate per 100,000 Hours Flown			
Total	9.88	9.90	12.08
Fatal	1.71	1.65	2.06

* Number of General Aviation Aircraft

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DETAILED REVIEW

This subsection presents statistical tabulations of the operational factors, environmental conditions, losses, and causes of all general aviation accidents in 1980. Table 2 gives a breakdown of accidents (total and fatal), and fatalities aboard general aviation aircraft for various types of aircraft and for five kinds of flying. Total and fatal accident rates are presented for those categories for which flight hour estimates are available and considered reliable. The personal and business flying categories are combined for rate computations. Accident rates are portrayed graphically for the years 1975 through 1980 in Figure 1 (for various aircraft types) and in Figure 2 (for various kinds of flying).

Table 2 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES BY TYPE OF AIRCRAFT AND BY KIND OF FLYING
ALL OPERATIONS
1980

Type of Aircraft	Accidents	Fatal Accidents	Fatalities Aboard	Accident Rate per 100,000 Aircraft Hours Flown: Total	Accident Rate per 100,000 Aircraft Hours Flown: Fatal
Fixed Wing	3236	572	1174	9.47	1.67
Single Recip. Engine	2857	462	876	10.63	1.72
Multiple Recip. Engine	330	99	256	7.35	2.20
Turbine Powered	53	14	42	1.91	0.50
Rotorcraft	263	40	57	13.91	2.12
Recip. Engine(s)	183	22	24	25.45	3.06
Turbine Powered	80	18	33	6.83	1.54
Gliders	62	7	7	n/a	n/a
Kind of Flying					
Personal	2046	393	812	11.83*	2.34*
Business	247	62	116		
Corporate/Executive	96	21	63	1.79	0.39
Aerial Application	363	25	28	17.60	1.21
Instructional	461	41	70	6.30	0.56
All Aircraft	3597	622	1243	9.88	1.71

* The accident rate per 100,000 flying hours is presented for the combination of personal flying and business flying and not for each category separately. For reasons which are inexplicable, the rate of aircraft accidents for pleasure flying is seven times greater than that of business flying — when assumptions traditionally used to arbitrarily separate the two categories are employed (See Appendix C). This major — and apparently inaccurate — disparity in rates could be resolved, provided valid and objective exposure data were to be developed. Therefore, the NTSB concludes that the two categories should remain combined until sound exposure data are available that could justify their separation. At that time, two separate categories may well be established for safety reasons.

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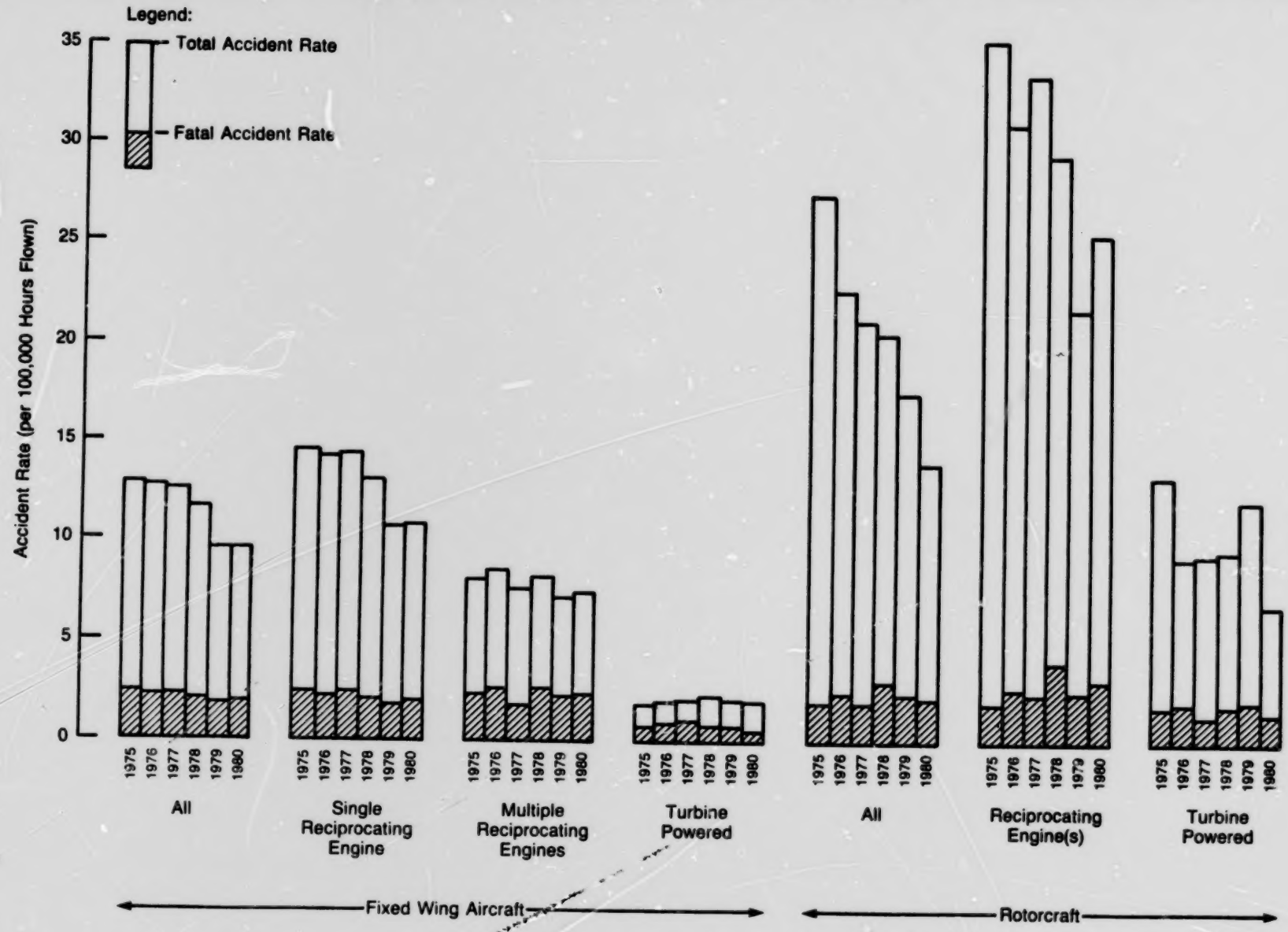

Figure 1 — Accident Rates by Type of Aircraft

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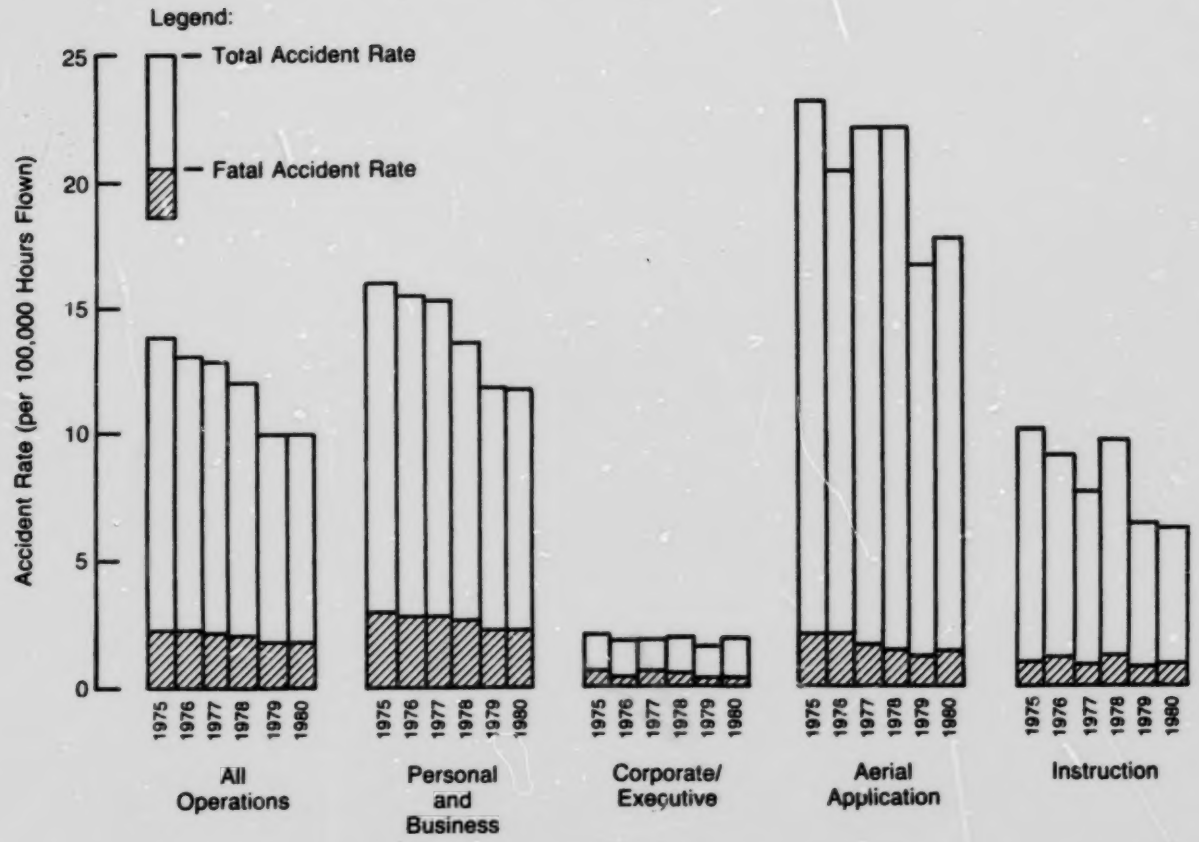

Figure 2 — Accident Rates by Kind of Flying

Table 3 presents a tabulation of the persons involved in accidents by their role and the degree of injury sustained in the accident. More than 72 percent of those aboard accident-involved aircraft sustained no more than minor injuries, while approximately 18 percent were killed.

Table 3 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL OPERATIONS
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	582	370	475	2203	3630
Copilot	33	7	11	50	101
Dual Student	18	17	18	137	190
Check Pilot	3	1	0	10	14
Flight Engineer	2	0	0	0	2
Extra Crew	7	2	7	11	27
Passengers	598	267	393	1730	2988
Total Aboard	1243	664	904	4141	6952
Other Aircraft*	2	5	1	30	38
Other Ground	7	12	16	12	47
Grand Total	1252	681	921	4183	7037
Percent	17.8	9.7	13.1	59.4	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

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Persons aboard accident-involved general aviation aircraft are tabulated by degree of injury and the kind of flying involved in Table 4. Overall, 27.4 percent of persons aboard received serious or fatal injuries. Among the kinds of flying listed in Table 4, the percentage of serious or fatal injuries was highest in business flying (35.1 percent) and lowest in aerial application (15.6 percent).

Table 4 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ALL OPERATIONS
1980

	Degree of Injury				
Kind of Flying	Fatal	Serious	Minor	None	Total
Personal	812	390	597	2573	4372
Business	116	53	52	261	482
Corporate/Executive	63	32	32	207	334
Aerial Application	28	30	64	250	372
Instructional	70	57	75	511	713
Other	154	102	84	339	679
Total	1243	664	904	4141	6952
Percent	17.9	9.6	13.0	59.6	

Table 5 tabulates accident-involved aircraft by the degree of damage to the aircraft and the degree of personal injury involved. Of the 3,595 aircraft destroyed or substantially damaged, 2,579 (or 71.7 percent) were involved in accidents in which no person received more than minor injuries.

Table 5 - AIRCRAFT BY DAMAGE AND DEGREE OF INJURY
ALL OPERATIONS
1980

	Degree of Injury				Aircraft	
Degree of Damage	Fatal	Serious	Minor	None	No.	Percent
Destroyed	564	172	118	164	1018	28.1
Substantial	66	214	398	1899	2577	71.0
Minor	2	2	0	8	12	0.3
None	5	15	0	0	20	0.5
Unk/Not Reported	1	0	0	0	1	0.0
No. of Aircraft	638	403	516	2071	3628	
Percent	17.6	11.1	14.2	57.1		

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The NTSB aviation accident data system permits the entry of either one or two types of accident to describe the occurrences in an accident. In Table 6, all valid accident types are listed with the number of aircraft involved in each type recorded. Second accident types are listed for approximately one-half of all accident-involved aircraft. The most frequent accident type in 1980 general aviation accidents - engine failure or malfunction - is seldom coded as the only accident type. Typically such an occurrence does not produce damage or injury sufficient to meet the criteria for an accident, but rather leads to a subsequent damage-and/or injury-producing event. Table 6 is the only table in this report which provides information on the second type of accident. In all other tables which present data on type of accident, only the data involving the first type of accident are used.

Table 6 - AIRCRAFT BY FIRST AND SECOND TYPE OF ACCIDENT
ALL OPERATIONS
1980

Type of Accident	First	Second	Either First or Second	
			Number	Percent of Accident-Involved Aircraft
Ground-Water Loop-Swerve	384	32	416	11.5
Dragged Wingtip Pod or Float	5	1	6	0.2
Wheels-up Landing	77	29	106	2.9
Wheels-down Landing in Water	3	1	4	0.1
Gear Collapsed	40	305	345	9.5
Gear Retracted	32	0	32	0.9
Hard Landing	262	73	335	9.2
Nose Over/Down	79	252	331	9.1
Roll Over	15	23	38	1.0
Overshoot	163	0	163	4.5
Undershoot	96	1	97	2.7
Col. Between Aircraft-Both in Flight	43	0	43	1.2
Col. Between Aircraft-One Airborne	10	0	10	0.3
Col. Between Aircraft-Both on Ground	14	1	15	0.4
Col. with Ground/Water-Controlled	202	133	335	9.2
Col. with Ground/Water-Uncontrolled	143	21	164	4.5
Col. with Wires/Poles	132	75	207	5.7
Col. with Trees	194	258	452	12.5
Col. with Residence/s	0	8	8	0.2
Col. with Building/s	10	8	18	0.5
Col. with Fence, Fenceposts	32	90	122	3.4
Col. with Electronic Towers	6	1	7	0.2
Col. with Runway or Approach Lights	9	7	16	0.4
Col. with Airport Hazard	7	1	8	0.2
Col. with Animals	4	0	4	0.1
Col. with Crop	15	40	55	1.5
Col. with Flagman Loader	1	0	1	0.0
Col. with Ditches	34	103	137	3.8

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Table 6 - (continued)

Type of Accident	First	Second	Either First or Second: Number	Either First or Second: Percent of Accident-Involved Aircraft
Col. with Snowbank	13	25	38	1.0
Col. with Parked Aircraft (Unattended)	16	24	40	1.1
Col. with Automobile	7	9	16	0.4
Col. with Dirt Bank	34	67	101	2.8
Col. with Other	64	76	140	3.9
Bird Strike	6	0	6	0.2
Stall	116	55	171	4.7
Spin	72	15	87	2.4
Spiral	5	4	9	0.2
Mush	137	20	157	4.3
Fire or Explosion	1	0	1	0.0
Fire or Explosion in Flight	14	4	18	0.5
Fire or Explosion on Ground	10	3	13	0.4
Airframe Failure in Flight	68	3	71	2.0
Airframe Failure on Ground	7	1	8	0.2
Engine Tearaway	0	1	1	0.0
Engine Failure or Malfunction	931	3	934	25.7
Propeller/Rotor Failure	1	0	1	0.0
Propeller Failure	15	0	15	0.4
Tail Rotor Failure	14	0	14	0.4
Main Rotor Failure	17	0	17	0.5
Prop/Rotor Accident to Person	13	0	13	0.4
Jet Intake/Exh Accident to Person	0	0	0	0.0
Propeller/Jet/Rotor Blast	5	0	5	0.1
Turbulence	12	0	12	0.3
Hail Damage to Aircraft	0	0	0	0.0
Lightning Strike	0	0	0	0.0
Evasive Maneuver	0	0	0	0.0
Uncontrolled Alt Deviation	0	0	0	0.0
Ditching	2	48	50	1.4
Missing Aircraft Not Recovered	13	0	13	0.4
Miscellaneous/Other	14	1	15	0.4
Undetermined	9	0	9	0.2
Number of Aircraft	3628	1822		

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Table 7 tabulates accidents by type and degree of injury. Collisions with the ground, either controlled or uncontrolled, accounted for more than one-third of the fatal accidents in 1980. These accidents produced fatalities in 61.7 percent of the cases. Engine failure or malfunction, the most frequent accident type, caused fatal injuries in only 8.8 percent of the 931 occurrences.

Table 7 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ALL OPERATIONS
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	3	8	39	334*	384*	10.7
Dragged Wingtip Pod or Float	1	0	0	4	5	0.1
Wheels-up Landing	0	1	1	75	77	2.1
Wheels-down Landing in Water	1	0	0	2	3	0.1
Gear Collapsed	0	2	3	35	40	1.1
Gear Retracted	1	0	0	31	32	0.9
Hard Landing	3	13	27	219	262	7.3
Nose Over/Down	0	3	12	64	79	2.2
Roll Over	0	1	4	10	15	0.4
Overshoot	7	13	24	119	163	4.5
Undershoot	5	14	10	67	96	2.7
Col. Between Aircraft-Both in Flight	18	3	0	2	23	0.6
Col. Between Aircraft-One Airborne	1	0	1	3*	5*	0.1
Col. Between Aircraft-Both on Ground	0	0	1	8*	9*	0.2
Col. with Ground/Water-Controlled	108	20	25	49	202	5.6
Col. with Ground/Water-Uncontrolled	105	9	15	14	143	4.0
Col. with Wires/Poles	30	25	20	57	132	3.7
Col. with Trees	64	30	36	64	194	5.4
Col. with Building/s	1	0	3	6	10	0.3
Col. with Fence, Fenceposts	1	2	5	24	32	0.9
Col. with Electronic Towers	4	1	1	0	6	0.2
Col. with Runway or Approach Lights	0	0	1	8	9	0.2
Col. with Airport Hazard	0	0	1	6	7	0.2
Col. with Animals	1	0	0	3	4	0.1
Col. with Crop	0	0	2	13	15	0.4
Col. with Flagman Loader	1	0	0	0	1	0.0
Col. with Ditches	1	2	4	27	34	0.9
Col. with Snowbank	0	0	1	12	13	0.4
Col. with Parked Aircraft (Unattended)	0	0	4	12	16	0.4
Col. with Automobile	0	0	1	6	7	0.2
Col. with Dirt Bank	1	4	6	23	34	0.9
Col. with Other	4	7	4	49	64	1.8

* In one collision between aircraft, one of the two aircraft involved experienced a ground loop-swerve, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted only as one accident in the totals at the end of the table.

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Table 7 (continued)

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Bird Strike	0	0	0	6	6	0.2
Stall	34	32	16	34	116	3.2
Stall/Spin	56	11	4	1	72	2.0
Stall/Spiral	1	2	2	0	5	0.1
Stall/Mush	13	24	28	72	137	3.8
Fire or Explosion	0	0	1	0	1	0.0
Fire or Explosion in Flight	1	0	5	8	14	0.4
Fire or Explosion on Ground	1	0	0	9	10	0.3
Airframe Failure in Flight	40	6	5	17	68	1.9
Airframe Failure on Ground	0	0	0	7	7	0.2
Engine Failure or Malfunction	82	148	188	513	931	25.9
Propeller/Rotor Failure	0	0	0	1	1	0.0
Propeller Failure	1	2	1	11	15	0.4
Tail Rotor Failure	2	4	0	8	14	0.4
Main Rotor Failure	3	0	6	8	17	0.5
Prop/Rotor Accident to Person	5	8	0	0	13	0.4
Propeller/Jet/Rotor Blast	0	0	1	4	5	0.1
Turbulence	0	2	3	7	12	0.3
Ditching	1	0	0	1	2	0.1
Missing Aircraft Not Recovered	13	0	0	0	13	0.4
Miscellaneous/Other	2	3	3	6	14	0.4
Undetermined	6	0	0	3	9	0.2
No. of Accidents	622	400	514	2061	3597	
Percent	17.3	11.1	14.3	57.3		

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More than 28 percent of the aircraft involved in accidents in 1980 were destroyed (See Table 8). Another 71 percent were substantially damaged.

Table 8 - AIRCRAFT BY TYPE OF ACCIDENT AND DAMAGE
ALL OPERATIONS
1980

Type of Accident	Degree of Damage					Aircraft	
	Des.	Sub.	Min.	None	Unk/ NR	No.	Percent
Ground-Water Loop-Swerve	23	360	1	0	0	384	10.6
Dragged Wingtip Pod or Float	1	4	0	0	0	5	0.1
Wheels-up Landing	2	75	0	0	0	77	2.1
Wheels-down Landing in Water	0	3	0	0	0	3	0.1
Gear Collapsed	1	39	0	0	0	40	1.1
Gear Retracted	1	31	0	0	0	32	0.9
Hard Landing	12	244	0	6	0	262	7.2
Nose Over/Down	0	79	0	0	0	79	2.2
Roll Over	1	14	0	0	0	15	0.4
Overshoot	19	144	0	0	0	163	4.5
Undershoot	16	80	0	0	0	96	2.6
Col. Between Aircraft-Both in Flight	31	11	1	0	0	43	1.2
Col. Between Aircraft-One Airborne	2	7	1	0	0	10	0.3
Col. Between Aircraft-Both on Ground	0	12	2	0	0	14	0.4
Col. with Ground/Water-Controlled	123	79	0	0	0	202	5.6
Col. with Ground/Water-Uncontrolled	108	35	0	0	0	143	3.9
Col. with Wires/Poles	54	78	0	0	0	132	3.6
Col. with Trees	107	86	1	0	0	194	5.3
Col. with Building/s	0	10	0	0	0	10	0.3
Col. with Fence, Fenceposts	3	29	0	0	0	32	0.9
Col. with Electronic Towers	6	0	0	0	0	6	0.2
Col. with Runway or Approach Lights	0	9	0	0	0	9	0.2
Col. with Airport Hazard	0	7	0	0	0	7	0.2
Col. with Animals	1	3	0	0	0	4	0.1
Col. with Crop	5	10	0	0	0	15	0.4
Col. with Flagman Loader	0	0	0	1	0	1	0.0
Col. with Ditches	3	31	0	0	0	34	0.9
Col. with Snowbank	0	13	0	0	0	13	0.4
Col. with Parked Aircraft (Unattended)	1	15	0	0	0	16	0.4
Col. with Automobile	2	5	0	0	0	7	0.2
Col. with Dirt Bank	7	27	0	0	0	34	0.9
Col. with Other	10	52	1	1	0	64	1.8
Bird Strike	0	6	0	0	0	6	0.2
Stall	48	68	0	0	0	116	3.2
Stall/Spin	56	16	0	0	0	72	2.0
Stall/Spiral	2	3	0	0	0	5	0.1
Stall/Mush	46	91	0	0	0	137	3.8
Fire or Explosion	1	0	0	0	0	1	0.0
Fire or Explosion in Flight	7	7	0	0	0	14	0.4
Fire or Explosion on Ground	5	5	0	0	0	10	0.3

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Table 8 (continued)

Type of Accident	Degree of Damage					Aircraft	
	Des.	Sub.	Min.	None	Unk/ NR	No.	Percent
Airframe Failure in Flight	42	26	0	0	0	68	1.9
Airframe Failure on Ground	0	7	0	0	0	7	0.2
Engine Failure or Malfunction	230	698	3	0	0	931	25.7
Propeller/Rotor Failure	0	1	0	0	0	1	0.0
Propeller Failure	3	12	0	0	0	15	0.4
Tail Rotor Failure	6	8	0	0	0	14	0.4
Main Rotor Failure	5	12	0	0	0	17	0.5
Prop/Rotor Accident to Person	0	2	2	9	0	13	0.4
Propeller/Jet/Rotor Blast	0	5	0	0	0	5	0.1
Turbulence	3	9	0	0	0	12	0.3
Ditching	2	0	0	0	0	2	0.1
Missing Aircraft Not Recovered	13	0	0	0	0	13	0.4
Miscellaneous/Other	3	8	0	3	0	14	0.4
Undetermined	7	1	0	0	1	9	0.2
No. of Aircraft	1018	2577	12	20	1	3628	
Percent	28.1	71.0	0.3	0.6	0.0		

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More than one-half of the aircraft involved in an accident during takeoff were in one of three accident types (See Table 9): engine failure or malfunction (33.3 percent), ground-water loop-swerve (11.6 percent), or stall/mush (10.5 percent). More than sixty percent of engine failures or malfunctions occurred during an inflight phase of operation.

Table 9 - AIRCRAFT BY TYPE OF ACCIDENT AND PHASE OF OPERATION
ALL OPERATIONS
1980

Type of Accident	Phase of Operation						Aircraft	
	Static	Taxi	Take-Off	Inflight	Landing	Unknown	No.	Percent
Ground-Water Loop-Swerve	0	12	82	0	290	0	384	10.6
Dragged Wingtip Pod or Float	0	0	1	0	4	0	5	0.1
Wheels-up Landing	0	0	2	0	75	0	77	2.1
Wheels-down Landing in Water	0	0	0	0	3	0	3	0.1
Gear Collapsed	0	4	8	0	27	1	40	1.1
Gear Retracted	1	1	7	0	23	0	32	0.9
Hard Landing	0	0	5	1	256	0	262	7.2
Nose Over/Down	0	13	12	1	53	0	79	2.2
Roll Over	1	4	4	1	5	0	15	0.4
Overshoot	0	0	0	0	163	0	163	4.5
Undershoot	0	0	0	0	96	0	96	2.6
Col. Between Aircraft-Both in Flight	0	0	1	24	18	0	43	1.2
Col. Between Aircraft-One Airborne	1	0	0	0	9	0	10	0.3
Col. Between Aircraft-Both on Ground	3	7	3	0	1	0	14	0.4
Col. with Ground/Water-Controlled	0	0	25	129	45	3	202	5.6
Col. with Ground/Water-Uncontrolled	0	1	28	83	30	1	143	3.9
Col. with Wires/Poles	0	6	13	90	23	0	132	3.6
Col. with Trees	0	2	44	80	67	1	194	5.3
Col. with Building/s	0	6	2	0	2	0	10	0.3
Col. with Fence, Fenceposts	0	2	17	1	12	0	32	0.9
Col. with Electronic Towers	0	0	0	6	0	0	6	0.2
Col. with Runway or Approach Lights	0	2	2	0	5	0	9	0.2
Col. with Airport Hazard	0	4	0	0	3	0	7	0.2
Col. with Animals	0	0	4	0	0	0	4	0.1
Col. with Crop	0	1	4	7	3	0	15	0.4
Col. with Flagman Loader	0	0	0	1	0	0	1	0.0
Col. with Ditches	0	8	18	0	8	0	34	0.9
Col. with Snowbank	0	0	2	0	11	0	13	0.4
Col. with Parked Aircraft (Unattended)	0	13	1	0	2	0	16	0.4
Col. with Automobile	0	2	1	1	3	0	7	0.2
Col. with Dirt Bank	0	2	13	5	14	0	34	0.9
Col. with Other	0	8	14	7	34	1	64	1.8
Bird Strike	0	0	1	5	0	0	6	0.2
Stall	0	0	48	34	34	0	116	3.2
Stall/Spin	0	0	15	40	16	1	72	2.0
Stall/Spiral	0	0	1	1	3	0	5	0.1
Stall/Mush	0	0	74	39	24	0	137	3.8

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Table 9 (continued)

Type of Accident	Phase of Operation						Aircraft	
	Static	Taxi	Take-Off	Inflight	Landing	Unknown	No.	Percent
Fire or Explosion	0	0	0	1	0	0	1	0.0
Fire or Explosion in Flight	0	0	2	8	3	1	14	0.4
Fire or Explosion on Ground	5	1	1	0	3	0	10	0.3
Airframe Failure in Flight	0	0	5	59	4	0	68	1.9
Airframe Failure on Ground	0	0	4	0	3	0	7	0.2
Engine Failure or Malfunction	0	0	235	561	134	1	931	25.7
Propeller/Rotor Failure	0	0	0	1	0	0	1	0.0
Propeller Failure	0	0	3	12	0	0	15	0.4
Tail Rotor Failure	0	0	0	13	1	0	14	0.4
Main Rotor Failure	0	0	2	13	2	0	17	0.5
Prop/Rotor Accident to Person	11	2	0	0	0	0	13	0.4
Propeller/Jet/Rotor Blast	1	4	0	0	0	0	5	0.1
Turbulence	0	1	0	8	3	0	12	0.3
Ditching	0	0	0	0	2	0	2	0.0
Missing Aircraft Not Recovered	0	0	0	0	0	13	13	0.4
Miscellaneous/Other	0	3	2	7	2	0	14	0.4
Undetermined	0	0	0	2	0	7	9	0.2
No. of Aircraft	23	109	706	1241	1519	30	3628	
Percent	0.6	3.0	19.5	34.2	41.9	0.8		

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The detailed phase of operation and degree of injury are tabulated in Table 10 for all accident-involved general aviation aircraft. The proportion of accidents producing fatal injuries varied substantially among the phases of operation. In the most frequent phase of operation, for example, only 12 of 611 aircraft (or 2.0 percent) involved in an accident during level off/touchdown were involved in fatal accidents. In contrast, aircraft in the next most frequent phase (normal cruise) were involved in fatal accidents 25.2 percent of the time.

Table 10 - AIRCRAFT BY PHASE OF OPERATION AND DEGREE OF INJURY
ALL OPERATIONS
1980

	Degree of Injury				Aircraft	
Phase of Operation	Fatal	Serious	Minor	None	No.	Percent
Static:						
Starting Engine/s	2	1	0	5	8	0.2
Idling Engine/s	1	6	0	4	11	0.3
Engine Runup	0	0	0	1	1	0.0
Idling Rotors	1	0	0	1	2	0.1
Other	0	0	0	1	1	0.0
Taxi:						
To Takeoff	0	0	2	39	41	1.1
From Landing	0	1	2	37	40	1.1
Other	1	1	4	12	18	0.5
Ground Taxi from Landing	0	0	1	0	1	0.0
Ground Taxi, Other	1	0	0	0	1	0.0
Aerial Taxi to Takeoff	0	0	0	2	2	0.1
Aerial Taxi to/from Landing	0	0	1	1	2	0.1
Aerial Taxi, Other	0	3	0	1	4	0.1
Takeoff:						
Run	5	5	19	115	144	4.0
Initial Climb	79	79	76	242	476	13.1
Vertical	2	2	6	10	20	0.5
Running (Rotorcraft/VTOL-STOL)	0	2	2	0	4	0.1
Aborted (Fixed-Wing)	1	4	9	38	52	1.4
Aborted (Rotorcraft/VTOL)	0	0	1	3	4	0.1
Other	0	2	1	3	6	0.2
Inflight:						
Climb to Cruise	9	15	16	37	77	2.1
Normal Cruise	124	66	82	220	492	13.6
Descending	20	19	17	23	79	2.2
Holding (IFR)	1	0	0	0	1	0.0
Hovering	3	3	4	8	18	0.5
Power-On Descent (Rotorcraft)	0	1	0	2	3	0.1
Autorotative Descent	0	0	0	2	2	0.1
Acrobatics	35	6	4	6	51	1.4
Buzzing	23	9	3	1	36	1.0
Uncontrolled Descent	73	1	3	3	80	2.2

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Table 10 (continued)

Phase of Operation	Degree of Injury				Aircraft	
	Fatal	Serious	Minor	None	No.	Percent
Emergency Descent	0	0	1	0	1	0.0
Low Pass	32	10	9	25	76	2.1
Other	53	15	19	25	112	3.1
En Route to Treat Crop*	1	1	6	11	19	0.5
En Route to Reloading Area*	1	0	2	1	4	0.1
Survey Field/Area*	0	0	0	2	2	0.1
Starting Swath Run*	1	2	0	11	14	0.4
Swath Run*	3	7	12	35	57	1.6
Flareout for Swath Run*	0	0	0	3	3	0.1
Pullup from Swath Run*	3	2	4	14	23	0.6
Procedure Turnaround*	7	7	17	35	66	1.8
Cleanup Swath*	2	1	2	7	12	0.3
Maneuver to Avoid Obstruction*	0	0	0	2	2	0.1
Return to Strip*	0	1	0	10	11	0.3
Landing:						
Traffic Pattern-Circling	38	12	15	28	93	2.6
Final Approach (VFR)	34	38	37	121	230	6.3
Initial Approach	7	2	2	1	12	0.3
Final Approach (IFR)	17	7	4	5	33	0.9
Level Off/Touchdown	12	36	70	493	611	16.8
Roll (Fixed Wing)	2	9	34	340	385	10.6
Roll-On/Run-On (Rotorcraft)	0	0	0	2	2	0.1
Power-On Landing (Rotorcraft)	3	1	3	20	27	0.7
Power-Off Autorotative Ldg	0	0	1	6	7	0.2
Go-Around (VFR)	13	23	24	48	108	3.0
Missed Approach (IFR)	4	0	0	0	4	0.1
Other	2	2	1	2	7	0.2
Unknown/Not Reported	22	1	0	7	30	0.8
No. of Aircraft	638	403	516	2071	3628	
Percent	17.6	11.1	14.2	57.1		

* These special inflight phases of operation are associated with aerial application operations.

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Table 11 tabulates the specific phase of operation and the degree of aircraft damage. The level off/touchdown phase, which was the most frequent phase of operation in all accidents, ranked sixth among accidents in which the aircraft was destroyed.

Table 11 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ALL OPERATIONS
1960

	Degree of Damage					Aircraft	
Phase of Operation	Des.	Sub.	Min.	None	Unk/ NR	No.	Percent
Static:							
Starting Engine/s	3	2	2	1	0	8	0.2
Idling Engine/s	0	5	0	6	0	11	0.3
Engine Runup	0	1	0	0	0	1	0.0
Idling Rotors	1	0	0	1	0	2	0.1
Other	0	1	0	0	0	1	0.0
Taxi:							
To Takeoff	0	40	1	0	0	41	1.1
From Landing	1	38	0	1	0	40	1.1
Other	0	18	0	0	0	18	0.5
Ground Taxi from Landing	0	1	0	0	0	1	0.0
Ground Taxi, Other	0	1	0	0	0	1	0.0
Aerial Taxi to Takeoff	0	2	0	0	0	2	0.1
Aerial Taxi to/from Landing	0	2	0	0	0	2	0.1
Aerial Taxi, Other	0	3	0	1	0	4	0.1
Takeoff:							
Run	18	125	1	0	0	144	4.0
Initial Climb	151	323	2	0	0	476	13.1
Vertical	4	16	0	0	0	20	0.5
Running (Rotorcraft/VTOL-STOL)	1	3	0	0	0	4	0.1
Aborted (Fixed-Wing)	5	47	0	0	0	52	1.4
Aborted (Rotorcraft/VTOL)	0	4	0	0	0	4	0.1
Other	0	5	0	1	0	6	0.2
Inflight:							
Climb to Cruise	26	50	1	0	0	77	2.1
Normal Cruise	180	312	0	0	0	492	13.6
Descending	30	48	0	1	0	79	2.2
Holding (IFR)	1	0	0	0	0	1	0.0
Hovering	8	10	0	0	0	18	0.5
Power-On Descent (Rotorcraft)	0	3	0	0	0	3	0.1
Autorotative Descent	0	2	0	0	0	2	0.1
Acrobatics	42	8	1	0	0	51	1.4
Buzzing	29	7	0	0	0	36	1.0
Uncontrolled Descent	68	12	0	0	0	80	2.2
Emergency Descent	0	1	0	0	0	1	0.0
Low Pass	43	33	0	0	0	76	2.1
Other	65	47	0	0	0	112	3.1
En Route to Treat Crop	3	16	0	0	0	19	0.5
En Route to Reloading Area	1	3	0	0	0	4	0.1
Survey Field/Area	0	2	0	0	0	2	0.1

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Table 11 (continued)

Phase of Operation	Degree of Damage					Aircraft	
	Des.	Sub.	Min.	None	Unk/ NR	No.	Percent
Starting Swath Run	3	10	0	1	0	14	0.4
Swath Run	24	33	0	0	0	57	1.6
Flareout for Swath Run	1	2	0	0	0	3	0.1
Pullup from Swath Run	9	14	0	0	0	23	0.6
Procedure Turnaround	26	40	0	0	0	66	1.8
Cleanup Swath	4	8	0	0	0	12	0.3
Maneuver to Avoid Obstruction	0	2	0	0	0	2	0.1
Return to Strip	3	8	0	0	0	11	0.3
Landing:							
Traffic Pattern-Circling	41	51	1	0	0	93	2.6
Final Approach (VFR)	59	170	0	1	0	230	6.3
Initial Approach	11	1	0	0	0	12	0.3
Final Approach (IFR)	20	13	0	0	0	33	0.9
Level Off/Touchdown	47	557	1	6	0	611	16.8
Roll (Fixed Wing)	15	368	2	0	0	385	10.6
Roll-On/Run-On (Rotorcraft)	0	2	0	0	0	2	0.1
Power-On Landing (Rotorcraft)	4	23	0	0	0	27	0.7
Power-Off Autorotative Ldg	0	7	0	0	0	7	0.2
Go-Around (VFR)	40	68	0	0	0	108	3.0
Missed Approach (IFR)	4	0	0	0	0	4	0.1
Other	3	4	0	0	0	7	0.2
Unknown/Not Reported	24	5	0	0	1	30	0.8
No. of Aircraft	1018	2577	12	20	1	3628	
Percent	28.1	71.0	0.3	0.6	0.0		

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Table 12 illustrates that nearly 80 percent of general aviation accidents in 1980 occurred in daylight and in VFR weather conditions. Of the 23 mid-air collisions involving U.S. general aviation aircraft, all but one occurred in these light and weather conditions.

Table 12 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
ALL OPERATIONS
1980

	Type of Weather				Accidents	
Light Conditions	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	29	5	0	1	35	1.0
Daylight	2841	137	10	14	3002	83.5
Dusk	108	22	0	5	135	3.7
Night (Dark)	219	99	13	16	347	9.6
Night (Moonlight-Bright)	50	2	0	0	52	1.4
Unknown/Not Reported	6	1	0	19	26	0.7
No. of Accidents	3253	266	23	55	3597	
Percent	90.4	7.4	0.7	1.5		

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Table 13 lists the number of accidents in each state by the month of occurrence. Three states (California, Texas, and Florida) had a combined 26.8 percent share of all general aviation accidents. Nationwide, January had the lowest number of accidents. The number of accidents per month rose steadily through August, then declined in each of the last four months of 1980.

Table 13 - ACCIDENTS BY STATE AND MONTH
ALL OPERATIONS
1980

State	Month of Occurrence												Accidents	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Percent
Alabama	0	6	2	5	6	9	6	5	6	2	1	0	48	1.3
Alaska	6	11	7	11	22	13	30	24	23	10	4	5	166	4.6
Arizona	9	7	8	9	18	12	10	7	10	11	6	6	113	3.1
Arkansas	3	3	7	4	10	8	14	8	9	5	3	1	75	2.1
California	23	34	54	52	46	38	42	54	25	35	23	25	451	12.5
Colorado	4	10	9	8	4	19	5	9	7	3	3	9	90	2.5
Connecticut	1	2	2	0	2	1	3	2	0	1	2	2	18	0.5
Delaware	0	0	0	1	0	0	2	0	0	0	1	0	4	0.1
Florida	15	19	18	19	16	21	18	29	27	19	14	28	243	6.8
Georgia	1	6	8	6	9	4	11	13	14	6	3	5	86	2.4
Hawaii	0	3	1	0	2	3	3	1	0	1	1	1	16	0.4
Idaho	3	1	3	2	1	6	3	8	2	5	5	1	40	1.1
Illinois	6	7	8	6	5	8	17	15	14	12	9	7	114	3.2
Indiana	1	3	6	12	6	4	10	12	7	5	3	3	72	2.0
Iowa	3	3	0	2	2	2	12	6	2	0	4	1	37	1.0
Kansas	1	3	1	5	6	8	5	9	8	5	4	3	58	1.6
Kentucky	4	4	1	4	2	4	3	5	1	4	4	3	39	1.1
Louisiana	2	4	3	9	14	10	12	9	12	7	4	5	91	2.5
Maine	1	2	3	0	2	3	5	2	1	1	0	0	20	0.6
Maryland	1	1	1	2	2	3	1	4	1	2	2	3	23	0.6
Massachusetts	0	0	3	0	4	4	4	6	1	2	5	3	32	0.9
Michigan	4	6	7	6	7	8	18	18	6	6	6	4	96	2.7
Minnesota	8	2	6	6	7	8	7	6	4	6	1	4	65	1.8
Mississippi	1	1	4	2	6	7	10	4	1	2	0	3	41	1.1
Missouri	1	8	3	6	5	13	11	8	4	11	9	3	82	2.3
Montana	3	2	1	4	3	10	5	4	3	3	1	1	40	1.1
Nebraska	2	1	1	4	2	2	6	6	5	0	3	1	33	0.9
Nevada	5	4	4	2	3	3	5	4	2	5	1	6	44	1.2
New Hampshire	1	2	0	2	3	2	0	3	3	2	1	0	19	0.5
New Jersey	2	2	4	2	7	9	5	4	2	7	4	2	50	1.4
New Mexico	4	6	4	4	5	3	9	3	7	8	7	3	63	1.7
New York	4	5	8	9	7	11	8	14	5	6	6	7	90	2.5
North Carolina	4	7	4	7	6	3	3	11	4	2	0	4	55	1.5
North Dakota	0	2	3	0	2	3	1	1	1	1	3	1	18	0.5
Ohio	3	4	3	6	13	11	14	15	12	8	6	8	103	2.9
Oklahoma	3	3	6	5	5	11	5	6	4	6	6	2	62	1.7
Oregon	4	4	6	6	7	9	10	11	7	5	2	4	75	2.1

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Table 13 (continued)

State	Month of Occurrence												Accidents	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	No.	Percent
Pennsylvania	4	4	7	5	13	9	6	9	10	4	8	2	81	2.2
Rhode Island	2	0	0	0	1	0	0	2	2	0	2	1	10	0.3
South Carolina	0	1	3	1	5	3	2	3	2	3	5	0	28	0.8
South Dakota	0	3	1	1	1	3	4	3	3	2	2	1	24	0.7
Tennessee	5	2	6	3	2	1	6	2	5	3	2	3	40	1.1
Texas	17	17	22	26	29	31	24	26	25	23	18	13	271	7.5
Utah	3	3	1	4	7	6	6	4	5	1	5	1	46	1.3
Vermont	3	0	0	2	0	0	2	2	0	1	0	0	10	0.3
Virginia	0	2	3	8	5	6	6	6	4	2	1	9	52	1.4
Washington	7	11	7	12	6	11	14	9	7	8	8	5	105	2.9
West Virginia	1	0	2	3	2	1	2	2	4	0	1	1	19	0.5
Wisconsin	1	5	2	7	9	3	4	11	10	5	2	1	60	1.7
Wyoming	0	6	0	1	5	1	3	6	3	7	1	3	36	1.0
D.C.	0	0	0	0	0	0	1	0	0	0	0	0	1	0.0
Puerto Rico	1	1	0	2	0	0	0	1	3	2	1	1	12	0.3
Virgin Islands	1	0	1	0	1	0	0	0	0	0	0	0	3	0.1
U.S. Terr. & Posses.	1	0	0	0	0	0	0	1	0	0	0	0	2	0.1
Pac. Ocean N. Lat.	0	0	0	1	0	0	1	0	1	0	0	0	3	0.1
Atl. Ocean N. Lat.	2	0	0	0	0	0	1	1	1	0	2	0	7	0.2
Int. Waters	0	0	0	0	0	0	0	1	1	0	0	0	2	0.1
Unk/Not Reported	1	2	1	1	1	2	0	1	0	1	2	1	13	0.4
No. of Accidents	182	245	265	305	354	370	415	436	326	276	217	206	3597	
Percent	5.6	6.8	7.3	8.4	9.8	10.3	11.3	12.1	9.0	7.6	6.1	5.7		

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The proximity to the airport and type of flight plan are tabulated in Table 14. More than 45 percent of the aircraft for which the proximity was reported were involved in an accident on the airport. Approximately 84 percent of the aircraft were being operated with no flight plan filed.

Table 14 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
ALL OPERATIONS
1980

	Type of Flight Plan									Aircraft	
Proximity to Airport	None	VFR	IFR	IFR (VFR cond. on Top)	DVFR	VFR Flight Following	Special VFR	Unk/NR	Other	No.	Percent
On Airport	1292	136	84	1	0	0	0	16	0	1529	42.1
On Seaplane Base	13	1	0	0	0	0	0	0	0	14	0.4
On Heliport	7	0	0	0	0	0	0	0	1	8	0.2
On Barge/Ship/Platform	1	0	0	0	0	0	0	0	1	2	0.1
In Traffic Pattern	105	16	6	0	0	0	0	0	1	128	3.5
Miles from Airport:											
Within 1/4	204	13	15	0	0	0	1	1	1	235	6.5
1/4+ to 1/2	92	7	10	0	0	0	0	1	0	110	3.0
1/2+ to 3/4	24	3	0	0	0	0	0	0	0	27	0.7
3/4+ to 1	74	3	6	0	1	0	1	1	1	87	2.4
1+ to 2	81	12	8	0	0	0	0	0	2	103	2.8
2+ to 3	48	5	10	0	0	0	0	0	1	64	1.8
3+ to 4	32	2	5	0	0	0	0	1	0	40	1.1
4+ to 5	23	4	4	1	0	0	0	0	0	32	0.9
Beyond 5	831	93	60	2	C	1	2	7	8	1004	27.7
Unk/Not Reported	220	11	6	1	0	0	0	5	1	244	6.7
Other	1	0	0	0	0	0	0	0	0	1	0.0
No. of Aircraft	3048	306	214	5	1	1	4	32	17	3628	
Percent	84.0	8.4	5.9	0.2	0.0	0.0	0.1	0.9	0.5		

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An emergency locator transmitter (ELT) was a factor in locating at least 95 accident-involved aircraft in 1980. (See Table 15). More than one-third of accident-involved general aviation aircraft reportedly did not have an ELT installed. There were 276 post-crash fires reported - approximately one of every 13 accident-involved aircraft.

Table 15 - AIRCRAFT BY ELT AND FIRE AFTER IMPACT
ALL OPERATIONS
1980

	Fire After Impact			Aircraft	
Emergency Locator Transmitter	No	Yes	Unk/NR	No.	Percent
Operated-Used in Locating Aircraft	93	2	0	95	2.6
Operated-Not Used	522	10	1	533	14.7
Not Used-Not Armed	174	5	0	179	4.9
Not Used-Separation from Antenna	24	2	0	26	0.7
Not Used-Battery Malfunction	15	2	0	17	0.5
Not Used-Other Malfunction	32	4	0	36	1.0
Not Used-Impact/Fire Damage	52	42	0	94	2.6
Not Used-Operation Unknown	267	40	2	309	8.5
Not Installed	1203	121	1	1325	36.5
Not Applicable/Insufficient Impact	772	19	1	792	21.8
Unknown/Not Reported	189	29	4	222	6.1
No. of Aircraft	3343	276	9	3628	
Percent	92.1	7.6	0.3		

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In Table 16, the experience levels of accident-involved pilots (total and in-type) are listed. The median for total hours was in the range 500 - 999, while the median hours in type was between 100 and 499.

Table 16 - PILOTS BY TOTAL TIME AND TIME IN TYPE
ALL OPERATIONS
1980

	Time in Type (Hours)								
Total Time (Hours)	0-49	50-99	100-499	500-999	1000-4999	5000 or More	Not Reported	Total	Percent
0 - 49	258	0	0	0	0	0	7	265	7.3
50 - 99	133	109	0	0	0	0	10	252	6.9
100 - 499	396	181	351	0	0	0	41	969	26.7
500 - 999	120	51	213	75	0	0	32	491	13.5
1000 - 4999	184	110	350	152	160	0	86	1042	28.7
5000 - 9999	41	24	75	34	89	13	22	298	8.2
10000 or More	22	14	43	27	47	30	18	201	5.5
Not Reported	5	1	4	1	2	1	96	110	3.0
Total	1159	490	1036	289	298	44	312	3628	
Percent	31.9	13.5	28.6	8.0	8.2	1.2	8.6		

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Table 17 shows the age distribution of pilots involved in accidents and fatal accidents, and of pilots for whom conclusive toxicology results were obtained. The median age of accident-involved pilots was between 35 and 39 years. The median age of pilots involved in fatal accidents was between 40 and 44 years. Toxicology test results were positive for alcohol in 12.6 percent of the cases in which conclusive results were obtained.

Table 17 - PILOTS BY AGE AND RESULTS OF TOXICOLOGY EXAM
ALL OPERATIONS
1980

	Number of Toxicology Tests		Pilots Involved in Fatal Accidents		Pilots Involved in Accidents	
Age Group	Conclusive Results	Positive for Alcohol	Number	Percent	Number	Percent
15 - 19	8	1	9	1.4	70	1.9
20 - 24	35	1	50	7.8	332	9.2
25 - 29	48	10	69	10.8	489	13.5
30 - 34	68	11	105	16.5	559	15.4
35 - 39	51	4	83	13.0	495	13.6
40 - 44	73	7	97	15.2	454	12.5
45 - 49	51	8	74	11.6	410	11.3
50 - 54	45	4	64	10.0	323	8.9
55 - 59	38	6	52	8.2	236	6.5
60 - 64	12	3	15	2.4	112	3.1
65 - 69	10	0	12	1.9	53	1.5
70 or Over	3	0	3	0.5	18	0.5
Not Reported	1	1	5	0.8	77	2.1
Total	443	56	638	100.0	3628	100.0

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Table 18 lists the ten detailed causes of general aviation accidents most frequently cited in 1980. Seven of these 10 causes are pilot-related. A complete listing of causes and related factors is contained in Appendix B.

Table 18 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ALL OPERATIONS
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	409	11.4
Pilot-Failed to Obtain/Maintain Flying Speed	347	9.6
Pilot-Mismanagement of Fuel	255	7.1
Misc Acts, Conditions-Fuel Exhaustion	226	6.3
Powerplant-Misc-Faulure for Undet. Reasons	222	6.2
Pilot-Improper Level Off	189	5.3
Misc Acts, Conditions-Material Failure	189	5.3
Pilot-Selected Unsuitable Terrain	168	4.7
Pilot-Misjudged Distance and Speed	161	4.5
Pilot-Failed to Maintain Directional Control	134	3.7

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HISTORICAL COMPARISON

This subsection presents several tables which facilitate the comparison of the characteristics of 1980 general aviation accidents with those of the period 1975 - 1979. The data for the years 1975 - 1979 are arithmetic means for that five year period, listed in descending order of frequency.

Table 19 lists, for the years 1975 through 1980, the numbers of accidents, fatal accidents, and fatalities. Estimated general aviation flight hours 1/ and computed accident and fatal accident rates also are presented. As the data show, 1980 had the fewest accidents and fatal accidents among the six years. When the 1980 figures are compared to the corresponding means for the prior five years, it is seen that while accidents were down by 10.7 percent, fatal accidents were reduced by only 6.3 percent and fatalities aboard general aviation aircraft were down by even less - only 1.9 percent. Both the accident rate and the fatal accident rate were substantially lower in 1980 than in the years 1975 through 1978. Rates for 1979 and 1980 were virtually the same.

Table 19 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL OPERATIONS
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard General Aviation Aircraft
1975	4001	636	1258	1237
1976	4023	662	1226	1213
1977	4083	663	1280	1269
1978	4218	721	1558	1400
1979	3825	638	1237	1218
1980	3597	622	1252	1243

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown *	
		Total	Fatal
1975	28,799,000	13.89	2.20
1976	30,476,000	13.19	2.17
1977	31,578,000	12.93	2.10
1978	34,887,000	12.08	2.06
1979	38,641,000	9.90	1.65
1980	36,402,000	9.88	1.71

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1975 (2), 1976 (4), 1977 (1), 1978 (2), 1980 (1)
Fatal - 1975 (2), 1976 (1), 1977 (1), 1978 (2), 1980 (1)

1/ Flight hour estimates are based upon Federal Aviation Administration estimates. FAA estimates of total hours are reduced by the number of hours flown in commuter and airtaxi operation and by a portion of the total rental hours dedicated to such operations.

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The most prevalent types of accidents in the base period 1975 - 1979 are listed in Table 20 with the mean accident frequencies and percentages for that period and for 1980. With the total number of accidents down by 10.7 percent from the base period, the numbers of most accident types decreased in 1980. One notable exception is wheels-up landing accidents which increased by 16.7 percent over the mean of 66 per year in the base period.

Table 20 - MOST PREVALENT TYPES OF ACCIDENTS
ALL OPERATIONS
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	931	25.9	988.6	24.5
Col. with Object	578	16.1	630.8	15.7
Ground-Water Loop-Swerve	384	10.7	488.8	12.1
Hard Landing	262	7.3	260.2	6.5
Col. with Ground/Water-Controlled	202	5.6	202.0	5.0
Overshoot	163	4.5	175.8	4.3
Stall/Mush	137	3.8	174.4	4.3
Col. with Ground/Water-Uncontrolled	143	4.0	150.2	3.7
Nose Over/Down	79	2.2	136.2	3.4
Stall	116	3.2	127.8	3.2
Undershoot	96	2.7	120.0	3.0
Stall/Spin	72	2.0	92.6	2.3
Airframe Failure in Flight	68	1.9	67.4	1.7
Wheels-up Landing	77	2.1	66.0	1.6
Gear Collapsed	40	1.1	51.0	1.3
Gear Retracted	32	0.9	41.8	1.0
(All Other Types)	217	6.0	256.4	6.4
Total	3597	100.0	4030.0	100.0

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Table 21 presents the most frequent types of fatal accidents. Among fatal accidents, controlled collisions with the ground or water increased in 1980 by 9.5 percent over the base period.

Table 21 - MOST PREVALENT TYPES OF FATAL ACCIDENTS
ALL OPERATIONS
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Col. with Ground/Water-Uncontrolled	105	16.9	112.8	17.0
Col. with Object	108	17.4	110.4	16.6
Col. with Ground/Water-Controlled	108	17.4	98.6	14.8
Engine Failure or Malfunction	82	13.2	86.2	13.0
Stall/Spin	56	9.0	68.2	10.3
Airframe Failure in Flight	40	6.4	43.0	6.5
Stall	34	5.5	42.2	6.4
Col. Between Aircraft-Both in Flight	18	2.9	18.2	2.7
Stall/Mush	13	2.1	15.2	2.3
Missing Aircraft Not Recovered	13	2.1	12.8	1.9
Stall/Spiral	1	0.2	9.2	1.4
Undershoot	5	0.8	8.2	1.2
(All Other Types)	39	6.3	39.0	5.9
Total	622	100.0	664.0	100.0

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Tables 22 and 23 present the phase of operation for all accidents and fatal accidents respectively. There is little difference between 1980 and the base period in the distribution among the various phases of operation for all accidents. The distribution of fatal accidents in 1980 showed relatively fewer accidents in flight and more during takeoff and landing operations.

Table 22 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ALL OPERATIONS
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
Landing	1519	41.9	1687.6	41.4
In Flight	1241	34.2	1401.6	34.4
Takeoff	706	19.5	789.4	19.4
Taxi	109	3.0	141.2	3.5
Not Reported	30	0.8	28.0	0.7
Static	23	0.6	27.0	0.7
Total	3628	100.0	4074.8	100.0

Table 23 - PHASE OF OPERATION FOR FATAL ACCIDENT-INVOLVED AIRCRAFT
ALL OPERATIONS
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
In Flight	391	61.3	455.2	66.9
Landing	132	20.7	117.4	17.2
Takeoff	87	13.6	81.8	12.0
Not Reported	22	3.4	20.2	3.0
Static	4	0.6	4.4	0.6
Taxi	2	0.3	1.6	0.2
Total	638	100.0	680.6	100.0

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The pilot was cited as a cause or factor in 78.8 percent of general aviation accidents in 1980 (Table 24). Three aircraft-related cause/factors (See systems, airframe, and rotorcraft) increased in both the number and percentage of accidents in which they were cited. The percentage of accidents in which terrain was a cause or factor dropped from 25.8 in the base period to 20.8 in 1980.

Table 24 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
ALL OPERATIONS
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	2837	78.8	3306.2	82.0
Terrain	751	20.8	1040.0	25.8
Weather	822	22.8	875.0	21.7
Powerplant	568	15.7	581.4	14.4
Personnel	346	9.6	387.0	9.6
Airport/Airways and Facilities	226	6.2	327.8	8.1
Miscellaneous	164	4.5	151.6	3.7
Landing Gear	131	3.6	151.2	3.7
Undetermined	85	2.3	85.0	2.1
Systems	57	1.5	55.0	1.3
Airframe	61	1.6	43.2	1.0
Rotorcraft	47	1.3	38.0	0.9
Instrument/Equipment and Accessories	20	0.5	21.6	0.5
No. of Accidents with Cause(s) Assigned	3597		4030.0	

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Table 25 lists the number and percentage of fatal accidents in which each broad cause/factor was cited in 1980 and in the base period, 1975 - 1979. The percentages of fatal accidents with pilot and weather cause/factors dropped very slightly in 1980 when compared to the prior five-year period. The percentage of fatal accidents with terrain cause/factors dropped from 17.8 to 7.1.

Table 25 - BROAD CAUSE/FACTOR ASSIGNMENTS - FATAL ACCIDENTS
ALL OPERATIONS
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	539	86.7	581.2	87.5
Weather	238	38.3	264.2	39.8
Terrain	44	7.1	118.2	17.8
Personnel	75	12.1	72.2	10.9
Powerplant	52	8.4	54.6	8.2
Undetermined	51	8.2	48.8	7.3
Miscellaneous	19	3.1	20.2	3.0
Airframe	29	4.7	20.0	3.0
Systems	6	1.0	8.2	1.2
Airport/Airways/Facilities	10	1.6	7.8	1.2
Rotorcraft	8	1.3	7.4	1.1
Instruments/Equipment and Accessories	9	1.4	4.4	0.7
Landing Gear	0	0.0	0.6	0.1
No. of Fatal Accidents with Cause(s) Assigned	622		664.0	

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ALL FIXED WING AIRCRAFT

Tables 26 through 37 present tabulations of statistics for fixed wing (powered) aircraft only. In 1980, 90.0 percent of all U.S. general aviation accidents involved fixed wing aircraft. Of the 1,252 persons killed in general aviation accidents, 1,174 (or 93.8 percent) were aboard fixed wing aircraft.

Composing such a large proportion of all accidents, fixed wing aircraft statistics show little difference from those for all aircraft. According to FAA estimates, 93.8 percent of all hours flown are attributed to aircraft in this category. Therefore, accident rates for fixed wing aircraft have a great influence on overall general aviation rates.

Table 26 - SUMMARY OF LOSSES
ALL FIXED WING AIRCRAFT
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	572	597	670
Involved Serious Injury	334	310	381
Involved Minor Injury	444	513	560
Involved No Injury	1886	2062	2239
Total	3236	3482	3850
Fatalities			
Passenger	576	543	641
Crew	598	613	694
Other Persons	6	13	152
Total	1180	1169	1487
Aircraft Damaged*			
Destroyed	920	913	1014
Substantial	2324	2568	2853
Minor	12	21	23
None	10	13	11
Total	3266	3515	3901

* Number of Fixed Wing, General Aviation Aircraft

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Table 27 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL FIXED WING AIRCRAFT
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	540	317	410	2001	3268
Copilot	33	7	9	48	97
Dual Student	15	16	15	117	163
Check Pilot	3	1	0	9	13
Flight Engineer	2	0	0	0	2
Extra Crew	5	1	6	7	19
Passengers	576	233	352	1626	2787
Total Aboard	1174	575	792	3808	6349
Other Aircraft*	2	1	1	33	37
Other Ground	4	11	15	8	38
Grand Total	1180	587	808	3849	6424
Percent	18.4	9.1	12.06	59.9	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

Table 28 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ALL FIXED WING AIRCRAFT
1980

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	786	362	550	2466	4164
Business	112	51	46	243	452
Corporate/Executive	58	28	25	196	307
Aerial Application	24	23	50	212	309
Instructional	63	54	66	454	637
Other	131	57	55	237	480
Total	1174	575	792	3808	6349
Percent	18.5	9.1	12.5	60.0	

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Table 29 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ALL FIXED WING AIRCRAFT
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	3	8	39	331*	381*	11.8
Dragged Wingtip Pod or Float	1	0	0	4	5	0.1
Wheels-up Landing	0	1	1	75	77	2.4
Wheels-down Landing in Water	1	0	0	2	3	0.1
Gear Collapsed	0	1	3	35	39	1.2
Gear Retracted	1	0	0	31	32	1.0
Hard Landing	2	6	21	196	225	6.9
Nose Over/Down	0	3	12	62	77	2.4
Overshoot	7	13	24	116	160	4.9
Undershoot	5	11	10	62	88	2.7
Col. Between Aircraft-Both in Flight	17	3	0	2	22	0.7
Col. Between Aircraft-One Airborne	1	0	1	3*	5*	0.1
Col. Between Aircraft-Both on Ground	0	0	1	8*	9*	0.3
Col. with Ground/Water-Controlled	102	16	18	42	178	5.5
Col. with Ground/Water-Uncontrolled	93	5	9	12	119	3.7
Col. with Wires/Poles	26	15	13	43	97	3.0
Col. with Trees	63	23	29	51	166	5.1
Col. with Building/s	0	0	2	5	7	0.2
Col. with Fence, Fenceposts	1	2	4	22	29	0.9
Col. with Electronic Towers	3	1	0	0	4	0.1
Col. with Runway or Approach Lights	0	0	1	8	9	0.3
Col. with Airport Hazard	0	0	1	6	7	0.2
Col. with Animals	1	0	0	3	4	0.1
Col. with Crop	0	0	1	10	11	0.3
Col. with Flagman Loader	1	0	0	0	1	0.0
Col. with Ditches	1	2	4	27	34	1.0
Col. with Snowbank	0	0	1	12	13	0.4
Col. with Parked Aircraft (Unattended)	0	0	4	12	16	0.5
Col. with Automobile	0	0	1	5	6	0.2
Col. with Dirt Bank	1	3	6	21	31	1.0
Col. with Other	3	4	3	46	56	1.7
Bird Strike	0	0	0	6	6	0.2
Stall	34	29	15	33	111	3.4
Stall/Spin	54	7	3	1	65	2.0
Stall/Spiral	1	2	2	0	5	0.1
Stall/Mush	11	24	28	72	135	4.2

* In one collision between aircraft, one of the two aircraft involved experienced a ground loop-swerve, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted only as one accident in the totals at the end of the table.

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Table 29 (continued)

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Fire or Explosion	0	0	1	0	1	0.0
Fire or Explosion in Flight	1	0	4	5	10	0.3
Fire or Explosion on Ground	1	0	0	7	8	0.2
Airframe Failure in Flight	35	5	3	12	55	1.7
Airframe Failure on Ground	0	0	0	6	6	0.2
Engine Failure or Malfunction	79	137	172	463	851	26.3
Propeller/Rotor Failure	0	0	0	1	1	0.0
Propeller Failure	1	2	1	11	15	0.5
Prop/Rotor Accident to Person	3	8	0	0	11	0.3
Propeller/Jet/Rotor Blast	0	0	1	4	5	0.1
Turbulence	0	2	3	6	11	0.3
Ditching	1	0	0	1	2	0.1
Missing Aircraft Not Recovered	13	0	0	0	13	0.4
Miscellaneous/Other	1	1	2	4	8	0.2
Undetermined	4	0	0	3	7	0.2
No. of Accidents	572	334	444	1886	3236	
Percent	17.7	10.3	13.7	58.3		

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Table 30 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ALL FIXED WING AIRCRAFT
1980

Phase of Operation	Degree of Damage					Aircraft	
	Des.	Sub.	Min.	None	Unk/ NR	No.	Percent
Static:							
Starting Engine/s	2	2	2	1	0	7	0.2
Idling Engine/s	0	5	0	6	0	11	0.3
Engine Runup	0	1	0	0	0	1	0.0
Other	0	1	0	0	0	1	0.0
Taxi:							
To Takeoff	0	40	1	0	0	41	1.2
From Landing	1	38	0	1	0	40	1.2
Other	0	16	0	0	0	16	0.5
Ground Taxi from Landing	0	1	0	0	0	1	0.0
Takeoff:							
Run	18	121	1	0	0	140	4.3
Initial Climb	145	314	2	0	0	461	14.1
Aborted (Fixed-Wing)	4	47	0	0	0	51	1.6
Other	0	1	0	0	0	1	0.0
Inflight:							
Climb to Cruise	25	49	1	0	0	75	2.3
Normal Cruise	166	263	0	0	0	429	13.1
Descending	29	47	0	1	0	77	2.4
Holding (IFR)	1	0	0	0	0	1	0.0
Acrobatics	40	8	1	0	0	49	1.5
Buzzing	29	7	0	0	0	36	1.1
Uncontrolled Descent	63	10	0	0	0	73	2.2
Low Pass	38	32	0	0	0	70	2.1
Other	58	36	0	0	0	94	2.9
En Route to Treat Crop	2	13	0	0	0	15	0.5
En Route to Reloading Area	1	1	0	0	0	2	0.1
Survey Field/Area	0	2	0	0	0	2	0.1
Starting Swath Run	2	8	0	1	0	11	0.3
Swath Run	15	24	0	0	0	39	1.2
Flareout for Swath Run	1	2	0	0	0	3	0.1
Pullup from Swath Run	7	13	0	0	0	20	0.6
Procedure Turnaround	21	33	0	0	0	54	1.6
Cleanup Swath	4	5	0	0	0	9	0.3
Maneuver to Avoid Obstruction	0	1	0	0	0	1	0.0
Return to Strip	2	7	0	0	0	9	0.3
Landing:							
Traffic Pattern-Circling	39	42	1	0	0	82	2.5
Final Approach (VFR)	50	148	0	0	0	198	6.1
Initial Approach	11	1	0	0	0	12	0.4
Final Approach (IFR)	19	12	0	0	0	31	0.9
Level Off/Touchdown	44	534	1	0	0	579	17.7
Roll (Fixed Wing)	15	364	2	0	0	381	11.7
Go-Around (VFR)	40	67	0	0	0	107	3.3
Missed Approach (IFR)	4	0	0	0	0	4	0.1
Other	2	3	0	0	0	5	0.1
Unknown/Not Reported	21	5	0	0	1	27	0.8
No. of Aircraft	919	2324	12	10	1	3266	
Percent	28.1	71.2	0.4	0.3	0.0		

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Table 31 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
ALL FIXED WING AIRCRAFT
1980

Light Conditions	Type of Weather				Accident	
	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	24	5	0	1	30	0.9
Daylight	2515	127	10	13	2665	82.3
Dusk	105	22	0	5	132	4.1
Night (Dark)	207	97	13	16	333	10.3
Night (Moonlight-Bright)	48	2	0	0	50	1.5
Unknown/Not Reported	6	1	0	19	26	0.8
No. of Accidents	2905	254	23	54	3236	
Percent	89.8	7.8	0.7	1.7		

Table 32 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
ALL FIXED WING AIRCRAFT
1980

Proximity to Airport	Flight Plan									Aircraft	
	None	VFR	IFR	IFR (VFR cond. on Top)	DVFR	VFR Flight Following	Special VFR	Unk/NR	Other	No.	Percent
On Airport	1222	136	84	1	0	0	0	16	0	1459	44.7
On Seaplane Base	13	1	0	0	0	0	0	0	0	14	0.4
On Barge/Ship/Platform	1	0	0	0	0	0	0	0	0	1	0.0
In Traffic Pattern	102	16	6	0	0	0	0	0	1	125	3.8
Miles from Airport:											
Within 1/4	189	13	15	0	0	0	1	1	0	219	6.7
1/4+ to 1/2	88	7	10	0	0	0	0	1	0	106	3.2
1/2+ to 3/4	23	3	0	0	0	0	0	0	0	26	0.8
3/4+ to 1	67	3	6	0	1	0	0	1	1	79	2.4
1+ to 2	71	12	8	0	0	0	0	0	2	93	2.8
2+ to 3	45	5	10	0	0	0	0	0	1	61	1.9
3+ to 4	26	2	5	0	0	0	0	1	0	34	1.0
4+ to 5	21	4	4	1	0	0	0	0	0	30	0.9
Beyond 5	672	87	60	2	0	1	2	7	7	838	25.7
Unknown/Not Reported	157	11	6	1	0	0	0	5	0	180	5.5
OTHER	1	0	0	0	0	0	0	0	0	1	0.0
No. of Aircraft	2698	300	214	5	1	1	3	32	12	3266	
Percent	82.6	9.2	6.5	0.2	0.0	0.0	0.1	1.0	0.4		

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Table 33 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ALL FIXED WING AIRCRAFT
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	374	11.6
Pilot-Failed to Obtain/Maintain Flying Speed	335	10.4
Pilot-Mismanagement of Fuel	240	7.4
Misc Acts, Conditions-Fuel Exhaustion	211	6.5
Powerplant-Misc-Failure for Undetermined Reasons	194	6.0
Pilot-Improper Level Off	182	5.6
Pilot-Selected Unsuitable Terrain	159	4.9
Misc Acts, Conditions-Material Failure	157	4.9
Pilot-Misjudged Distance and Speed	155	4.8
Pilot-Failed to Maintain Directional Control	132	4.1

Table 34 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL FIXED WING AIRCRAFT
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Fixed Wing General Aviation Aircraft
1975	3648	612	1222	1199
1976	3697	626	1174	1160
1977	3748	634	1244	1234
1978	3850	670	1487	1335
1979	3482	597	1169	1156
1980	3236	572	1180	1174

Year	Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
		Total	Fatal
1975	28,393,000	12.84	2.15
1976	29,202,000	12.65	2.14
1977	30,166,000	12.42	2.10
1978	33,162,000	11.60	2.01
1979	36,760,000	9.47	1.62
1980	34,145,000	9.47	1.67

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1975 (1), 1976 (4), 1977 (1), 1978 (2), 1980 (1)
Fatal - 1975 (1), 1976 (1), 1977 (1), 1978 (2), 1980 (1)

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Table 35 - MOST PREVALENT TYPES OF ACCIDENTS
ALL FIXED WING AIRCRAFT
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	851	26.3	908.0	24.6
Col. with Object	491	15.2	556.2	15.1
Ground-Water Loop-Swerve	381	11.8	483.6	13.1
Hard Landing	225	7.0	228.8	6.2
Col. with Ground/Water-Controlled	178	5.5	174.8	4.7
Stall/Mush	135	4.2	172.6	4.7
Overshoot	160	4.9	171.4	4.7
Nose Over/Down	77	2.4	134.2	3.6
Col. with Ground/Water-Uncontrolled	119	3.7	130.8	3.5
Stall	111	3.4	123.4	3.3
Undershoot	88	2.7	106.2	2.9
Stall/Spin	65	2.0	86.6	2.4
Wheels-up Landing	77	2.4	66.0	1.8
Airframe Failure in Flight	55	1.7	57.0	1.5
Gear Collapsed	39	1.2	50.6	1.4
Gear Retracted	32	1.0	41.8	1.1
(All Other Types)	152	4.7	193.0	5.2
Total	3236	100.0	3685.0	100.0

Table 36 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ALL FIXED WING AIRCRAFT
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
Landing	1399	42.8	1575.2	42.3
In Flight	1069	32.7	1238.6	33.2
Takeoff	653	20.0	734.4	19.7
Taxi	98	3.0	131.4	3.5
Not Reported	27	0.8	26.0	0.7
Static	20	0.6	22.0	0.6
Total	3266	100.0	3727.6	100.0

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Table 37 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
ALL FIXED WING AIRCRAFT
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	2593	80.1	3055.2	82.9
Terrain	664	20.5	942.4	25.5
Weather	754	23.3	820.6	22.2
Powerplant	506	15.6	526.8	14.2
Personnel	300	9.2	344.6	9.3
Airport/Airways/Facilities	224	6.9	324.6	8.8
Landing Gear	130	4.0	150.2	4.0
Miscellaneous	143	4.4	131.2	3.5
Undetermined	74	2.2	73.4	1.9
Systems	50	1.5	51.6	1.4
Airframe	54	1.6	40.6	1.1
Instrument/Equipment and Accessories	16	0.4	17.0	0.4
No. of Accidents with Cause(s) Assigned	3236		3685.0	

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FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE

Statistics describing the accident experience of fixed wing aircraft powered by a single reciprocating engine are presented in Tables 38 through 45. In 1980, accidents involving these aircraft represented 88.3 percent of the total for all fixed wing aircraft, while their portion of flight hours was only 78.7 percent.

Table 38 - SUMMARY OF LOSSES
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	462	475	544
Involved Serious Injury	302	281	351
Involved Minor Injury	405	486	525
Involved No Injury	1688	1832	2020
Total	2857	3074	3440
Fatalities			
Passenger	412	391	456
Crew	464	475	541
Other Persons	12	13	153
Total	888	879	1150
Aircraft Damaged*			
Destroyed	768	758	861
Substantial	2096	2311	2593
Minor	9	17	21
None	9	12	11
Total	2882	3098	3486

* Number of Fixed Wing, Single Reciprocating Engine, General Aviation Aircraft

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Table 39 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1980

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	666	349	514	2222	3751
Business	83	34	34	162	313
Corporate/Executive	0	0	0	30	30
Aerial Application	22	22	48	209	301
Instructional	55	52	63	414	584
Other	50	43	35	169	297
Total	876	500	694	3206	5276
Percent	16.6	9.5	13.2	60.8	

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Table 40 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	2	5	37	318*	362*	12.7
Dragged Wingtip Pod or Float	1	0	0	4	5	0.2
Wheels-up Landing	0	0	0	43	43	1.5
Wheels-down Landing in Water	1	0	0	2	3	0.1
Gear Collapsed	0	1	3	24	28	1.0
Gear Retracted	0	0	0	11	11	0.4
Hard Landing	2	5	21	178	206	7.2
Nose Over/Down	0	3	11	61	75	2.6
Overshoot	6	12	22	111	151	5.3
Undershoot	3	11	8	54	76	2.7
Col. Between Aircraft-Both in Flight	16	3	0	2	21	0.7
Col. Between Aircraft-One Airborne	1	0	1	2*	4*	0.1
Col. Between Aircraft-Both on Ground	0	0	1	6*	7*	0.2
Col. with Ground/Water-Controlled	84	14	16	40	154	5.4
Col. with Ground/Water-Uncontrolled	71	5	8	10	94	3.3
Col. with Wires/Poles	22	14	12	40	88	3.1
Col. with Trees	47	21	28	48	144	5.0
Col. with Building/s	0	0	2	4	6	0.2
Col. with Fence, Fenceposts	0	2	4	22	28	1.0
Col. with Electronic Towers	3	1	0	0	4	0.1
Col. with Runway or Approach Lights	0	0	1	7	8	0.3
Col. with Airport Hazard	0	0	1	6	7	0.2
Col. with Animals	1	0	0	3	4	0.1
Col. with Crop	0	0	1	10	11	0.4
Col. with Flagman Loader	1	0	0	0	1	0.0
Col. with Ditches	1	2	4	25	32	1.1
Col. with Snowbank	0	0	1	10	11	0.4
Col. with Parked Aircraft (Unattended)	0	0	4	11	15	0.5
Col. with Automobile	0	0	1	3	4	0.1
Col. with Dirt Bank	1	3	6	19	29	1.0
Col. with Other	3	4	2	37	46	1.6
Bird Strike	0	0	0	3	3	0.1
Stall	31	29	14	32	106	3.7
Stall/Spin	46	7	3	1	57	2.0
Stall/Spiral	1	2	2	0	5	0.2
Stall/Mush	10	21	27	69	127	4.4

* In one collision between aircraft, one of the two aircraft involved experienced a ground loop-swerve, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted as only one accident in the totals at the end of the table.

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Table 40 (continued)

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Fire or Explosion	0	0	1	0	1	0.0
Fire or Explosion in Flight	1	0	2	3	6	0.2
Fire or Explosion on Ground	0	0	0	3	3	0.1
Airframe Failure in Flight	28	5	2	6	41	1.4
Airframe Failure on Ground	0	0	0	5	5	0.2
Engine Failure or Malfunction	61	122	152	430	765	26.8
Propeller/Rotor Failure	0	0	0	1	1	0.0
Propeller Failure	1	1	1	10	13	0.4
Prop/Rotor Accident to Person	2	6	0	0	8	0.3
Propeller/Jet/Rotor Blast	0	0	1	4	5	0.2
Turbulence	0	2	3	6	11	0.4
Missing Aircraft Not Recovered	12	0	0	0	12	0.4
Miscellaneous/Other	1	1	2	4	8	0.3
Undetermined	2	0	0	1	3	0.1
No. of Accidents	462	302	405	1688	2857	
Percent	16.1	10.6	14.2	59.1		

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Table 41 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1980

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Minor	None	No.	Percent
Static:						
Starting Engine/s	2	1	1	1	5	0.2
Idling Engine/s	0	2	0	5	7	0.2
Other	0	1	0	0	1	0.0
Taxi:						
To Takeoff	0	37	0	0	37	1.3
From Landing	0	33	0	1	34	1.2
Other	0	14	0	0	14	0.5
Ground Taxi from Landing	0	1	0	0	1	0.0
Takeoff:						
Run	12	108	1	0	121	4.2
Initial Climb	121	286	2	0	409	14.2
Aborted (Fixed-Wing)	3	46	0	0	49	1.7
Other	0	1	0	0	1	0.0
Inflight:						
Climb to Cruise	18	40	1	0	59	2.0
Normal Cruise	142	251	0	0	393	13.6
Descending	23	38	0	1	62	2.1
Holding (IFR)	1	0	0	0	1	0.0
Acrobatics	40	8	1	0	49	1.7
Buzzing	28	7	0	0	35	1.2
Uncontrolled Descent	45	8	0	0	53	1.8
Low Pass	34	32	0	0	66	2.3
Other	52	35	0	0	87	3.0
En Route to Treat Crop	2	12	0	0	14	0.5
En Route to Reloading Area	1	1	0	0	2	0.1
Survey Field/Area	0	2	0	0	2	0.1
Starting Swath Run	2	8	0	1	11	0.4
Swath Run	15	23	0	0	38	1.3
Flareout for Swath Run	1	2	0	0	3	0.1
Pullup from Swath Run	7	13	0	0	20	0.7
Procedure Turnaround	21	33	0	0	54	1.9
Cleanup Swath	4	5	0	0	9	0.3
Maneuver to Avoid Obstruction	0	1	0	0	1	0.0
Return to Strip	2	7	0	0	9	0.3
Landing:						
Traffic Pattern-Circling	34	38	1	0	73	2.5
Final Approach (VFR)	41	131	0	0	172	6.0
Initial Approach	7	0	0	0	7	0.2
Final Approach (IFR)	9	8	0	0	17	0.6
Level Off/Touchdown	38	464	0	0	502	17.4
Roll (Fixed Wing)	12	328	2	0	342	11.9
Go-Around (VFR)	35	64	0	0	99	3.4
Missed Approach (IFR)	1	0	0	0	1	0.0
Other	1	3	0	0	4	0.1
Unknown/Not Reported	14	4	0	0	18	0.6
No. of Aircraft	768	2096	9	9	2882	
Percent	26.6	72.7	0.3	0.3		

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Table 42 - MOST PREVALENT DETAILED ACCIDENT CAUSES
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	335	11.7
Pilot-Failed to Obtain/Maintain Flying Speed	306	10.7
Pilot-Mismanagement of Fuel	211	7.4
Misc Acts, Conditions-Fuel Exhaustion	191	6.7
Powerplant-Misc-Failure for Undetermined Reasons	170	6.0
Pilot-Improper Level Off	169	5.9
Pilot-Misjudged Distance and Speed	148	5.2
Pilot-Selected Unsuitable Terrain	142	5.0
Misc Acts, Conditions-Material Failure	128	4.5
Pilot-Failed to Maintain Directional Control	124	4.3

Table 43 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	3309	517	978	955
1976	3321	512	905	893
1977	3387	544	1000	991
1978	3440	544	1150	997
1979	3074	475	879	866
1980	2857	462	888	876

Year	Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
		Total	Fatal
1975	22,881,000	14.46	2.26
1976	23,442,000	14.16	2.18
1977	23,798,000	14.23	2.28
1978	26,556,000	12.95	2.04
1979	29,128,000	10.55	1.63
1980	26,876,000	10.63	1.72

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1975 (1), 1976 (2), 1977 (1), 1978 (2), 1980 (1)
Fatal - 1975 (1), 1976 (1), 1977 (1), 1978 (2), 1980 (1)

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Table 44 - MOST PREVALENT TYPES OF ACCIDENTS
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	765	26.8	819.6	24.8
Col. with Object	438	15.3	510.2	15.4
Ground-Water Loop-Swerve	362	12.7	452.8	13.7
Hard Landing	206	7.2	213.8	6.5
Stall/Mush	127	4.4	165.8	5.0
Overshoot	151	5.3	156.8	4.7
Col. with Ground/Water-Controlled	154	5.4	150.4	4.5
Nose Over/Down	75	2.6	132.2	4.0
Stall	106	3.7	116.4	3.5
Col. with Ground/Water-Uncontrolled	94	3.3	109.4	3.3
Undershoot	76	2.7	94.0	2.8
Stall/Spin	57	2.0	80.6	2.4
Airframe Failure in Flight	41	1.4	48.0	1.5
Wheels-up Landing	43	1.5	38.2	1.2
Gear Collapsed	28	1.0	37.2	1.1
(All Other Types)	134	4.7	180.8	5.5
Total	2857	100.0	3306.2	100.0

Table 45 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
FIXED WING AIRCRAFT - SINGLE RECIPROCATING ENGINE
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
Landing	1217	42.2	1385.0	41.4
In Flight	968	33.6	1132.0	33.9
Takeoff	580	20.1	670.0	20.0
Taxi	86	3.0	117.6	3.5
Static	13	0.5	19.4	0.6
Not Reported	18	0.6	19.4	0.6
Total	2882	100.0	3343.4	100.0

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FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES

Tables 46 through 53 describe the characteristics of accidents involving fixed wing aircraft with two or more reciprocating engines. Such accidents accounted for 9.2 percent of all general aviation accidents and 15.9 percent of fatal accidents in 1980. The corresponding percentages for the prior five-year period were 8.5 (all) and 14.5 (fatal). Compared to their single-engine counterparts, fixed wing aircraft with multiple reciprocating engines had a considerably better overall accident rate, but a slightly higher fatal accident rate (compare Tables 43 and 51).

Table 46 - SUMMARY OF LOSSES
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	99	109	112
Involved Serious Injury	27	26	24
Involved Minor Injury	31	20	33
Involved No Injury	173	204	198
Total	330	359	367
Fatalities			
Passenger	137	131	166
Crew	119	120	126
Other Persons	6	11	3
Total	262	262	295
Aircraft Damaged*			
Destroyed	137	133	132
Substantial	191	226	234
Minor	2	2	1
None	1	1	0
Total	331	362	367

* Number of Fixed Wing, Multiple Reciprocating Engine, General Aviation Aircraft

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Table 47 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1980

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	111	12	32	224	379
Business	26	17	10	78	131
Corporate/Executive	32	16	17	66	131
Aerial Application	2	0	0	0	2
Instructional	8	2	3	40	53
Other	77	13	19	59	168
Total	256	60	81	467	864
Percent	29.6	6.9	9.4	54.1	

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Table 48 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	1	3	2	10	16	4.8
Wheels-up Landing	0	1	1	28	30	9.1
Gear Collapsed	0	0	0	10	10	3.0
Gear Retracted	1	0	0	19	20	6.1
Hard Landing	0	0	0	15	15	4.5
Nose Over/Down	0	0	1	1	2	0.6
Overshoot	1	1	2	4	8	2.4
Undershoot	1	0	2	7	10	3.0
Col. Between Aircraft-Both in Flight	3	0	0	0	3	0.9
Col. Between Aircraft-One Airborne	0	0	0	1	1	0.3
Col. Between Aircraft-Both on Ground	0	0	0	3	3	0.9
Col. with Ground/Water-Controlled	14	1	1	2	18	5.4
Col. with Ground/Water-Uncontrolled	19	0	1	2	22	6.7
Col. with Wires/Poles	4	1	1	3	9	2.7
Col. with Trees	15	2	1	3	21	6.4
Col. with Building/s	0	0	0	1	1	0.3
Col. with Fence, Fenceposts	1	0	0	0	1	0.3
Col. with Runway or Approach Lights	0	0	0	1	1	0.3
Col. with Ditches	0	0	0	2	2	0.6
Col. with Snowbank	0	0	0	2	2	0.6
Col. with Parked Aircraft (Unattended)	0	0	0	1	1	0.3
Col. with Automobile	0	0	0	2	2	0.6
Col. with Dirt Bank	0	0	0	2	2	0.6
Col. with Other	0	0	1	6	7	2.1
Bird Strike	0	0	0	1	1	0.3
Stall	2	0	1	1	4	1.2
Stall/Spin	7	0	0	0	7	2.1
Stall/Mush	1	2	0	3	6	1.8
Fire or Explosion in Flight	0	0	1	2	3	0.9
Fire or Explosion on Ground	1	0	0	4	5	1.5
Airframe Failure in Flight	6	0	0	2	8	2.4
Airframe Failure on Ground	0	0	0	1	1	0.3
Engine Failure or Malfunction	18	15	16	30	79	23.9
Propeller Failure	0	0	0	1	1	0.3
Prop/Rotor Accident to Person	0	1	0	0	1	0.3
Ditching	1	0	0	1	2	0.6
Missing Aircraft Not Recovered	1	0	0	0	1	0.3
Undetermined	2	0	0	2	4	1.2
No. of Accidents	99	27	31	173	330	
Percent	30.0	8.2	9.4	52.4		

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Table 49 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1980

Phase of Operation	Degree of Damage					Aircraft	
	Des.	Sub.	Minor	None	Unk/ NR	No.	Percent
Static:							
Starting Engine/s	0	1	0	0	0	1	0.3
Idling Engine/s	0	1	0	1	0	2	0.6
Engine Runup	0	1	0	0	0	1	0.3
Taxi:							
To Takeoff	0	3	1	0	0	4	1.2
From Landing	1	5	0	0	0	6	1.8
Other	0	2	0	0	0	2	0.6
Takeoff:							
Run	5	11	0	0	0	16	4.8
Initial Climb	23	25	0	0	0	48	14.5
Aborted (Fixed-Wing)	1	1	0	0	0	2	0.6
Inflight:							
Climb to Cruise	7	8	0	0	0	15	4.5
Normal Cruise	23	6	0	0	0	29	8.8
Descending	4	6	0	0	0	10	3.0
Buzzing	1	0	0	0	0	1	0.3
Uncontrolled Descent	15	2	0	0	0	17	5.1
Low Pass	4	0	0	0	0	4	1.2
Other	6	1	0	0	0	7	2.1
Landing:							
Traffic Pattern-Circling	4	4	0	0	0	8	2.4
Final Approach (VFR)	8	16	0	0	0	24	7.2
Initial Approach	2	1	0	0	0	3	0.9
Final Approach (IFR)	8	3	0	0	0	11	3.3
Level Off/Touchdown	6	58	1	0	0	65	19.6
Roll (Fixed Wing)	3	33	0	0	0	36	10.9
Go-Around (VFR)	5	3	0	0	0	8	2.4
Missed Approach (IFR)	2	0	0	0	0	2	0.6
Other	1	0	0	0	0	1	0.3
Unknown/Not Reported	7	0	0	0	1	8	2.4
No. of Aircraft	136	191	2	1	1	331	
Percent	41.1	57.7	0.6	0.3	0.3		

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Table 50 - MOST PREVALENT DETAILED ACCIDENT CAUSES
FIXED WING AIRCRAFT - MULTIPLE, RECIPROCATING ENGINE
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	38	11.5
Pilot-Mismanagement of Fuel	28	8.5
Pilot-Failed to Obtain/Maintain Flying Speed	24	7.3
Powerplant-Misc-Failure for Undetermined Reasons	23	7.0
Misc-Undetermined	22	6.7
Misc Acts, Conditions-Material Failure	22	6.7
Misc Acts, Conditions-Fuel Exhaustion	20	6.1
Pilot-Selected Unsuitable Terrain	16	4.8
Pilot-Continued VFR Flight into Adverse Weather Cond.	14	4.2
Pilot-Improper In-Flight Decisions or Planning	14	4.2
Pilot-Spatial Disorientation	14	4.2
Misc Acts, Conditions-Fuel Starvation	14	4.2

Table 51 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	312	84	208	208
1976	346	103	238	231
1977	324	73	173	166
1978	367	112	295	292
1979	359	109	262	251
1980	330	99	262	256

Year	Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
		Total	Fatal
1975	3,918,000	7.96	2.14
1976	4,085,000	8.42	2.52
1977	4,320,000	7.50	1.69
1978	4,496,000	8.16	2.49
1979	5,098,000	7.04	2.14
1980	4,491,000	7.35	2.20

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1976 (2)
Fatal - none

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Table 52 - MOST PREVALENT TYPES OF ACCIDENTS
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	79	23.9	82.4	24.1
Col. with Object	49	14.8	39.8	11.7
Ground-Water Loop-Swerve	16	4.8	26.8	7.8
Wheels-up Landing	30	9.1	24.8	7.3
Gear Retracted	20	6.1	24.4	7.1
Col. with Ground/Water-Controlled	18	5.5	21.2	6.2
Col. with Ground/Water-Uncontrolled	22	6.7	18.4	5.4
Hard Landing	15	4.5	13.6	4.0
Overshoot	8	2.4	13.6	4.0
Gear Collapsed	10	3.0	12.0	3.5
Undershoot	10	3.0	9.8	2.9
Airframe Failure in Flight	8	2.4	7.0	2.0
Stall	4	1.2	6.0	1.8
Fire or Explosion in Flight	3	0.9	6.0	1.8
Stall/Spin	7	2.1	5.8	1.7
Stall/Mush	6	1.8	5.6	1.6
Col. Between Aircraft-Both in Flight	3	0.9	3.6	1.1
Missing Aircraft Not Recovered	1	0.3	3.6	1.1
(All Other Types)	21	6.4	17.2	5.0
Total	330	100.0	341.6	100.0

Table 53 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
FIXED WING AIRCRAFT - MULTIPLE RECIPROCATING ENGINES
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
Landing	158	47.7	166.2	48.5
In Flight	83	25.1	98.4	28.7
Takeoff	66	19.9	56.6	16.5
Taxi	12	3.6	13.0	3.8
Not Reported	8	2.4	6.2	1.8
Static	4	1.2	2.0	0.6
Total	331	100.0	342.4	100.0

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FIXED WING AIRCRAFT - TURBINE POWERED

Fixed wing, turbine-powered aircraft accounted for 7.6 percent of estimated general aviation flight hours in 1980, but were involved in only 1.5 percent of accidents. Accident statistics for these aircraft are presented in Tables 54 through 61. Engine failure or malfunction accidents (approximately one-fourth of all general aviation accidents) accounted for only 13.2 percent of accidents involving turbine-powered fixed wing aircraft in 1980. There were six airframe failure in flight accidents in 1980 compared to only 10 in the previous five years.

Of the total of 53 accidents in this category, 41 involved turboprop airplanes. Using an estimate of 1,530,000 hours flown by such aircraft produces an accident rate of 2.68 per 100,000 hours flown. Twelve turbojet airplanes were involved in accidents in 1980. With an estimated 1,249,000 hours flown, turbojet airplanes compiled an accident rate of 0.96 per 100,000 hours.

Table 54 - SUMMARY OF LOSSES
FIXED WING AIRCRAFT - TURBINE POWERED
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	14	17	16
Involved Serious Injury	5	3	7
Involved Minor Injury	8	7	2
Involved No Injury	26	28	23
Total	53	55	48
Fatalities			
Passenger	27	21	19
Crew	15	18	27
Other Persons	3	1	3
Total	45	40	49
Aircraft Damaged*			
Destroyed	15	22	21
Substantial	37	31	26
Minor	1	2	1
Total	53	55	48

* Number of Fixed Wing, Turbine Powered, General Aviation Aircraft

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Table 55 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
FIXED WING AIRCRAFT - TURBINE POWERED
1980

Kind of Flying	Degree of Injury				Total
	Fatal	Serious	Minor	None	
Personal	9	1	4	20	34
Business	3	0	2	3	8
Corporate/Executive	26	12	8	100	146
Aerial Application	0	1	2	3	6
Other	4	1	1	9	15
Total	42	15	17	135	209
Percent	20.1	7.2	8.1	64.6	

Table 56 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
FIXED WING AIRCRAFT - TURBINE POWERED
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	0	0	0	3	3	5.7
Wheels-up Landing	0	0	0	4	4	7.5
Gear Collapsed	0	0	0	1	1	1.9
Gear Retracted	0	0	0	1	1	1.9
Hard Landing	0	1	0	3	4	7.5
Overshoot	0	0	0	1	1	1.9
Undershoot	1	0	0	1	2	3.8
Col. Between Aircraft-Both in Flight	1	0	0	0	1	1.9
Col. with Ground/Water-Controlled	4	1	1	0	6	11.3
Col. with Ground/Water-Uncontrolled	3	0	0	0	3	5.7
Col. with Trees	1	0	0	0	1	1.9
Col. with Other	0	0	0	3	3	5.7
Bird Strike	0	0	0	2	2	3.8
Stall	1	0	0	0	1	1.9
Stall/Spin	1	0	0	0	1	1.9
Stall/Mush	0	1	1	0	2	3.8
Fire or Explosion in Flight	0	0	1	0	1	1.9
Airframe Failure in Flight	1	0	1	4	6	11.3
Engine Failure or Malfunction	0	0	4	3	7	13.2
Propeller Failure	0	1	0	0	1	1.9
Prop Rotor Accident to Person	1	1	0	0	2	3.8
No. of Accidents	14	5	8	26	53	
Percent	26.4	9.4	15.1	49.1		

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Table 57 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
FIXED WING AIRCRAFT - TURBINE POWERED
1980

	Degree of Damage			Aircraft	
Phase of Operation	Des.	Sub.	Minor	No.	Percent
Static:					
Starting Engine/s	0	0	1	1	1.9
Idling Engine/s	0	2	0	2	3.8
Takeoff:					
Run	1	2	0	3	5.7
Initial Climb	1	3	0	4	7.5
Inflight:					
Climb to Cruise	0	1	0	1	1.9
Normal Cruise	1	6	0	7	13.2
Descending	2	3	0	5	9.4
Uncontrolled Descent	3	0	0	3	5.7
En Route to Treat Crop	0	1	0	1	1.9
Swath Run	0	1	0	1	1.9
Landing:					
Traffic Pattern-Circling	1	0	0	1	1.9
Final Approach (VFR)	1	1	0	2	3.8
Initial Approach	2	0	0	2	3.8
Final Approach (IFR)	2	1	0	3	5.7
Level Off/Touchdown	0	12	0	12	22.6
Roll (Fixed Wing)	0	3	0	3	5.7
Missed Approach (IFR)	1	0	0	1	1.9
Unknown/Not Reported	0	1	0	1	1.9
No. of Aircraft	15	37	1	53	
Percent	28.3	69.8	1.9		

Table 58 - MOST PREVALENT DETAILED ACCIDENT CAUSES
FIXED WING AIRCRAFT - TURBINE POWERED
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Misc Acts, Condition-Material Failure	7	13.2
Pilot-Improper IFR Operation	6	11.3
Pilot-Failed to Obtain/Maintain Flying Speed	5	9.4
Misc Acts, Conditions-Fatigue Fracture	5	9.4
Misc-Undetermined	4	7.5
Pilot-Inadequate Supervision of Flight	3	5.7

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Table 59 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
FIXED WING AIRCRAFT - TURBINE POWERED
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	29	11	36	36
1976	35	13	38	36
1977	42	19	79	77
1978	48	16	49	46
1979	55	17	40	39
1980	53	14	45	42

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	1,594,000	1.82	0.69
1976	1,675,000	2.09	0.78
1977	2,049,000	2.05	0.93
1978	2,110,000	2.27	0.76
1979	2,534,000	2.17	0.67
1980	2,778,000	1.91	0.50

Table 60 - MOST PREVALENT TYPES OF ACCIDENTS
FIXED WING AIRCRAFT - TURBINE POWERED
1980 AND 1975 - 1979

Type of Accident	1980		1975 - 1979	
	No.	Percent	Mean	Percent
Col. with Object	4	7.5	6.2	14.8
Engine Failure or Malfunction	7	13.2	6.0	14.4
Ground-Water Loop-Swerve	3	5.7	4.0	9.6
Col. with Ground/Water-Controlled	6	11.3	3.2	7.7
Col. with Ground/Water-Uncontrolled	3	5.7	3.0	7.2
Wheels-up Landing	4	7.5	3.0	7.2
Undershoot	2	3.8	2.4	5.7
Airframe Failure in Flight	6	11.3	2.0	4.8
Hard Landing	4	7.5	1.4	3.3
Gear Collapsed	1	1.9	1.4	3.3
Gear Retracted	1	1.9	1.4	3.3
Stall/Mush	2	3.8	1.2	2.9
Stall	1	1.9	1.0	2.4
Overshoot	1	1.9	1.0	2.4
Col. Between Aircraft-Both in Flight	1	1.9	0.6	1.4
Fire or Explosion in Flight	1	1.9	0.6	1.4
(All Other Types)	6	11.3	3.4	8.1
Total	53	100.0	41.8	100.0

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Table 61 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
FIXED WING AIRCRAFT - TURBINE POWERED
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
Landing	24	45.3	24.0	57.4
In Flight	18	34.0	8.2	19.6
Takeoff	7	13.2	7.8	18.7
Taxi	0	0.0	0.8	1.9
Static	3	5.7	0.6	1.4
Not Reported	1	1.9	0.4	1.0
Total	53	100.0	41.8	100.0

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ALL ROTORCRAFT

Tables 62 through 73 present statistics for all accidents involving rotorcraft. The annual number of rotorcraft accidents has remained fairly constant over the six years between 1975 and 1980. Over this period, estimated flight hours have increased each year, resulting in overall accident rates which show steady and substantial improvement. No such reduction has occurred in the fatal accident rate, however. The 2.12 fatal accidents per 100,000 hours flown in 1980 is only slightly better than the rate for the prior five year period. (2.30 fatal accidents per 100,000 hours flown).

Table 62 - SUMMARY OF LOSSES
ALL ROTORCRAFT
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	40	35	41
Involved Serious Injury	34	32	28
Involved Minor Injury	54	49	54
Involved No Injury	135	151	162
Total	263	267	285
Fatalities			
Passenger	20	20	13
Crew	37	32	37
Other Persons	3	6	8
Total	60	58	58
Aircraft Damaged*			
Destroyed	80	68	86
Substantial	182	196	195
Minor	0	2	2
None	1	1	2
Total	263	267	285

* Number of General Aviation Rotorcraft

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Table 63 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL ROTORCRAFT
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	32	31	47	153	263
Copilot	0	0	2	1	3
Dual Student	3	0	3	16	22
Check Pilot	0	0	0	1	1
Extra Crew	2	1	1	4	8
Passengers	20	21	23	85	149
Total Aboard	57	53	76	260	446
Other Aircraft*	0	4	0	1	5
Other Ground	3	1	1	4	9
Grand Total	60	58	77	265	460
Percent	13.0	12.6	16.7	57.6	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

Table 64 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ALL ROTORCRAFT
1980

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	16	7	14	51	88
Business	4	2	6	18	30
Corporate/Executive	5	4	7	11	27
Aerial Application	4	7	14	37	62
Instructional	6	0	7	44	57
Other	22	33	28	99	182
Total	57	53	76	260	446
Percent	12.8	11.9	17.0	58.3	

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Table 65 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ALL ROTORCRAFT
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Gear Collapsed	0	1	0	0	1	0.4
Hard Landing	1	0	5	19	25	9.5
Nose Over/Down	0	0	0	2	2	0.8
Roll Over	0	1	4	10	15	5.7
Col. Between Aircraft-Both in Flight	1	0	0	1	2	0.8
Col. with Ground/Water-Controlled	6	1	4	6	17	6.5
Col. with Ground/Water-Uncontrolled	9	3	5	2	19	7.2
Col. with Wires/Poles	3	6	4	8	21	8.0
Col. with Trees	1	5	3	3	12	4.6
Col. with Building/s	1	0	1	1	3	1.1
Col. with Fence, Fenceposts	0	0	1	0	1	0.4
Col. with Electronic Towers	1	0	1	0	2	0.8
Col. with Crop	0	0	1	2	3	1.1
Col. with Dirt Bank	0	0	0	2	2	0.8
Col. with Other	1	1	1	2	5	1.9
Stall/Mush	1	0	0	0	1	0.4
Fire or Explosion in Flight	0	0	0	3	3	1.1
Fire or Explosion on Ground	0	0	0	1	1	0.4
Airframe Failure in Flight	3	1	2	4	10	3.8
Airframe Failure on Ground	0	0	0	1	1	0.4
Engine Failure or Malfunction	3	11	16	49	79	30.0
Tail Rotor Failure	1	4	0	8	13	4.9
Main Rotor Failure	3	0	6	8	17	6.5
Prop/Rotor Accident to Person	2	0	0	0	2	0.8
Turbulence	0	0	0	1	1	0.4
Miscellaneous/Other	1	0	0	2	3	1.1
Undetermined	2	0	0	0	2	0.8
No. of Accidents	40	34	54	135	263	
Percent	15.2	12.9	20.5	51.4		

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Table 66 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ALL ROTORCRAFT
1980

Phase of Operation	Degree of Damage			Aircraft	
	Des.	Sub.	None	No.	Percent
Static:					
Starting Engine/s	1	0	0	1	0.4
Idling Rotors	1	0	1	2	0.8
Taxi:					
Other	0	2	0	2	0.8
Ground Taxi, Other	0	1	0	1	0.4
Aerial Taxi to Takeoff	0	2	0	2	0.8
Aerial Taxi to/from Landing	0	2	0	2	0.8
Aerial Taxi, Other	0	3	0	3	1.1
Takeoff:					
Run	0	2	0	2	0.8
Initial Climb	3	3	0	6	2.3
Vertical	4	16	0	20	7.6
Running (Rotorcraft/VTOL-STOL)	1	3	0	4	1.5
Aborted (Rotorcraft/VTOL)	0	4	0	4	1.5
Other	0	1	0	1	0.4
Inflight:					
Climb to Cruise	1	1	0	2	0.8
Normal Cruise	13	41	0	54	20.5
Descending	1	0	0	1	0.4
Hovering	8	10	0	18	6.8
Power-On Descent (Rotorcraft)	0	3	0	3	1.1
Autorotative Descent	0	2	0	2	0.8
Uncontrolled Descent	4	0	0	4	1.5
Emergency Descent	0	1	0	1	0.4
Low Pass	5	1	0	6	2.3
Other	6	9	0	15	5.7
En Route to Treat Crop	1	3	0	4	1.5
En Route to Reloading Area	0	2	0	2	0.8
Starting Swath Run	1	2	0	3	1.1
Swath Run	9	8	0	17	6.5
Pullup from Swath Run	2	1	0	3	1.1
Procedure Turnaround	5	7	0	12	4.6
Cleanup Swath	0	3	0	3	1.1
Maneuver to Avoid Obstruction	0	1	0	1	0.4
Return to Strip	1	1	0	2	0.8
Landing:					
Traffic Pattern-Circling	2	5	0	7	2.7
Final Approach (VFR)	4	4	0	8	3.0
Level Off/Touchdown	1	6	0	7	2.7
Roll-On/Run-On (Rotorcraft)	0	2	0	2	0.8
Power-On Landing (Rotorcraft)	4	23	0	27	10.3
Power-Off Autorotative Ldg	0	7	0	7	2.7
Unknown/Not Reported	2	0	0	2	0.8
No. of Aircraft	80	182	1	263	
Percent	30.4	69.2	0.4		

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Table 67 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
ALL ROTORCRAFT
1980

Light Conditions	Type of Weather			Accident	
	VFR	IFR	Unk/NR	No.	Percent
Dawn	5	0	0	5	1.9
Daylight	229	10	1	240	91.2
Dusk	3	0	0	3	1.1
Night (Dark)	11	2	0	13	4.9
Night (Moonlight-Bright)	2	0	0	2	0.8
No. of Accidents	250	12	1	263	
Percent	95.1	4.6	0.3		

Table 68 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
ALL ROTORCRAFT
1980

Proximity to Airport	Flight Plan				Aircraft	
	None	VFR	Special VFR	Other	No.	Percent
On Airport	45	0	0	0	45	17.1
On Heliport	7	0	0	1	8	3.0
On Barge/Ship/Platform	0	0	0	1	1	0.4
In Traffic Pattern	2	0	0	0	2	0.8
Miles from Airport:						
Within 1/4	5	0	0	1	6	2.3
1/4+ to 1/2	2	0	0	0	2	0.8
1/2+ to 3/4	1	0	0	0	1	0.4
3/4+ to 1	4	0	1	0	5	1.9
1+ to 2	6	0	0	0	6	2.3
2+ to 3	3	0	0	0	3	1.1
3+ to 4	4	0	0	0	4	1.5
4+ to 5	1	0	0	0	1	0.4
Beyond 5	127	5	0	1	133	50.6
Unknown/Not Reported	45	0	0	1	46	17.5
No. of Aircraft	252	5	1	5	263	
Percent	95.8	1.9	0.4	1.9		

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Table 69 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ALL ROTORCRAFT
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Misc Acts, Conditions-Material Failure	30	11.4
Pilot-Inadequate Preflight Prep. and/or Planning	29	11.0
Powerplant-Misc-Failure for Undetermined Reasons	28	10.6
Pilot-Failed to Maintain Adequate Rotor RPM	19	7.2
Pilot-Failed to See and Avoid Objects or Obstructions	17	6.5
Pilot-Misjudged Clearance	16	6.1
Personnel-Inadequate Maintenance and Inspection	16	6.1
Pilot-Improper Operation of Flight Controls	14	5.3
Pilot-Mismanagement of Fuel	14	5.3
Misc Acts, Conditions-Fuel Exhaustion	14	5.3

Table 70 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ALL ROTORCRAFT
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard General Aviation Rotorcraft
1975	266	18	30	28
1976	249	26	39	39
1977	247	22	28	25
1978	285	41	58	50
1979	267	35	58	52
1980	263	40	60	57

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	974,000	27.31	1.85
1976	1,103,000	22.57	2.36
1977	1,170,000	21.11	1.88
1978	1,397,000	20.40	2.93
1979	1.522,000	17.54	2.30
1980	1,891,000	13.91	2.12

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Table 71 - MOST PREVALENT TYPES OF ACCIDENTS
ALL ROTORCRAFT
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	79	30.0	80.4	30.6
Col. with Object	49	18.6	49.0	18.6
Hard Landing	25	9.5	24.4	9.3
Col. with Ground/Water-Controlled	17	6.5	22.2	8.4
Roll Over	15	5.7	17.8	6.8
Col. with Ground/Water-Uncontrolled	19	7.2	17.6	6.7
Tail Rotor Failure	13	4.9	17.2	6.5
Main Rotor Failure	17	6.5	9.0	3.4
Airframe Failure in Flight	10	3.8	8.0	3.0
Miscellaneous/Other	3	1.1	4.8	1.8
(All Other Types)	16	6.1	12.4	4.7
Total	263	100.0	262.8	100.0

Table 72 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ALL ROTORCRAFT
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
In Flight	153	58.2	150.8	57.4
Landing	58	22.1	51.2	19.5
Takeoff	37	14.1	45.4	17.3
Taxi	10	3.8	9.6	3.7
Static	3	1.1	4.4	1.7
Not Reported	2	0.8	1.4	0.5
Total	263	100.0	262.8	100.0

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Table 73 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
ALL ROTORCRAFT
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	158	60.0	179.6	68.3
Terrain	64	24.3	74.0	28.1
Powerplant	62	23.5	54.2	20.6
Rotorcraft	46	17.4	38.0	14.4
Personnel	37	14.0	33.6	12.7
Weather	33	12.5	30.0	11.4
Miscellaneous	18	6.8	15.6	5.9
Undetermined	10	3.8	9.6	3.6
Instruments/Equipment and Accessories	1	0.3	2.4	0.9
Airport/Airways/Facilities	2	0.7	1.8	0.6
Systems	4	1.5	1.2	0.4
Landing Gear	1	0.3	1.0	0.3
Airframe	2	0.7	0.8	0.3
No. of Accidents with Cause(s) Assigned	263		262.8	

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ROTORCRAFT - RECIPROCATING ENGINE(S)

The characteristics of accidents involving reciprocating engine powered rotorcraft are tabulated in Tables 74 through 81. In 1980, accidents in this category accounted for 69.6 percent of all rotorcraft accidents and produced 49.1 percent of the resulting fatal and serious injuries. The numbers of accidents of the most common types was lower in 1980 than the mean numbers for the prior five years. The most notable exception was main rotor failure accidents. There were 11 such accidents in 1980 compared to a mean of 7.2 per year for the period 1975 through 1979.

Table 74 - SUMMARY OF LOSSES
ROTORCRAFT - RECIPROCATING ENGINE(S)
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	22	21	30
Involved Serious Injury	24	24	18
Involved Minor Injury	35	33	41
Involved No Injury	102	109	136
Total	183	187	225
Fatalities			
Passenger	1	6	7
Crew	23	20	28
Other Persons	1	6	7
Total	25	32	42
Aircraft Damaged*			
Destroyed	54	45	66
Substantial	129	140	157
Minor	0	1	1
None	0	1	1
Total	183	187	225

* Number of Reciprocating Engine, General Aviation Aircraft

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Table 75 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ROTORCRAFT - RECIPROCATING ENGINE(S)
1980

Kind of Flying	Degree of Injury				Total
	Fatal	Serious	Minor	None	
Personal	13	6	10	30	59
Business	0	1	3	15	19
Corporate/Executive	0	1	2	5	8
Aerial Application	4	7	12	35	58
Instructional	6	0	3	37	46
Other	1	15	15	48	79
Total	24	30	45	170	269
Percent	8.9	11.2	16.7	63.2	

Table 76 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ROTORCRAFT - RECIPROCATING ENGINE(S)
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Gear Collapsed	0	1	0	0	1	0.5
Hard Landing	0	0	4	14	18	9.8
Nose Over/Down	0	0	0	2	2	1.1
Roll Over	0	1	3	7	11	6.0
Col. with Ground/Water-Controlled	4	0	4	5	13	7.1
Col. with Ground/Water-Uncontrolled	4	2	3	2	11	6.0
Col. with Wires/Poles	3	3	1	6	13	7.1
Col. with Trees	1	5	2	3	11	6.0
Col. with Building/s	1	0	1	0	2	1.1
Col. with Fence, Fenceposts	0	0	1	0	1	0.5
Col. with Electronic Towers	1	0	1	0	2	1.1
Col. with Crop	0	0	1	2	3	1.6
Col. with Dirt Bank	0	0	0	2	2	1.1
Col. with Other	0	1	1	2	4	2.2
Stall/Mush	1	0	0	0	1	0.5
Fire or Explosion in Flight	0	0	0	2	2	1.1
Fire or Explosion on Ground	0	0	0	1	1	0.5
Airframe Failure in Flight	3	1	1	2	7	3.8
Airframe Failure on Ground	0	0	0	1	1	0.5
Engine Failure or Malfunction	1	6	9	37	53	29.0
Tail Rotor Failure	0	4	0	6	10	5.5
Main Rotor Failure	2	0	3	6	11	6.0
Turbulence	0	0	0	1	1	0.5
Miscellaneous/Other	0	0	0	1	1	0.5
Undetermined	1	0	0	0	1	0.5
No. of Accidents	22	24	35	102	183	
Percent	12.0	13.1	19.1	55.8		

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Table 77 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ROTORCRAFT - RECIPROCATING ENGINE(S)
1980

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Static:				
Starting Engine/s	1	0	1	0.5
Taxi:				
Other	0	1	1	0.5
Ground Taxi, Other	0	1	1	0.5
Aerial Taxi to Takeoff	0	2	2	1.1
Aerial Taxi to/from Landing	0	3	3	1.6
Aerial Taxi, Other				
Takeoff:				
Run	0	1	1	0.5
Initial Climb	1	3	4	2.2
Vertical	1	10	11	6.0
Running (Rotorcraft/VTOL-STOL)	1	3	4	2.2
Aborted (Rotorcraft/VTOL)	0	3	3	1.6
Other	0	1	1	0.5
Inflight:				
Climb to Cruise	1	0	1	0.5
Normal Cruise	7	25	32	17.5
Descending	1	0	1	0.5
Hovering	6	5	11	6.0
Power-On Descent (Rotorcraft)	0	1	1	0.5
Autorotative Descent	0	1	1	0.5
Uncontrolled Descent	2	0	2	1.1
Emergency Descent	0	1	1	0.5
Low Pass	3	1	4	2.2
Other	3	7	10	5.5
En Route to Treat Crop	1	3	4	2.2
En Route to Reloading Area	0	2	2	1.1
Starting Swath Run	1	2	3	1.6
Swath Run	9	7	16	8.7
Pullup from Swath Run	2	1	3	1.6
Procedure Turnaround	5	5	10	5.5
Cleanup Swath	0	3	3	1.6
Maneuver to Avoid Obstruction	0	1	1	0.5
Return to Strip	1	0	1	0.5
Landing:				
Traffic Pattern-Circling	2	4	6	3.3
Final Approach (VFR)	2	3	5	2.7
Level Off/Touchdown	1	5	6	3.3
Roll-On/Run-On (Rotorcraft)	0	1	1	0.5
Power-On Landing (Rotorcraft)	2	17	19	10.4
Power-Off Autorotative Ldg	0	5	5	2.7
Unknown/Not Reported	1	0	1	0.5
No. of Aircraft	54	129	183	
Percent	29.5	70.5		

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Table 78 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ROTORCRAFT - RECIPROCATING ENGINE(S)
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Misc Acts, Conditions-Material Failure	22	12.0
Misc-Powerplant Failure for Undetermined Reasons	20	10.9
Pilot-Inadequate Preflight Prep. and/or Planning	19	10.4
Pilot-Failed to Maintain Adequate Rotor RPM	16	8.7
Pilot-Failed to See and Avoid Objects or Obstructions	12	6.6
Pilot-Improper Operation of Flight Controls	12	6.6
Pilot-Inadequate Supervision of Flight	12	6.6
Personnel-Inadequate Maintenance and Inspection	12	6.6
Pilot-Misjudged Clearance	11	6.0
Pilot-Mismanagement of Fuel	9	4.9
Misc Acts, Conditions-Fuel Exhaustion	9	4.9

Table 79 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ROTORCRAFT - RECIPROCATING ENGINE(S)
1975 - 1980

			Fatalities	
Year	Accidents	Fatal Accidents	Total	Aboard Aircraft in this Category
1975	219	12	16	16
1976	210	18	25	25
1977	191	14	17	17
1978	225	30	42	35
1979	187	21	32	26
1980	183	22	25	24

		Accident Rate per 100,000 Aircraft Hours Flown	
Year	Hours Flown	Total	Fatal
1975	623,000	35.15	1.93
1976	680,000	30.88	2.65
1977	571,000	33.45	2.45
1978	766,000	29.37	3.92
1979	859,000	21.77	2.44
1980	719,000	25.45	3.06

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Table 80 - MOST PREVALENT TYPES OF ACCIDENTS
ROTORCRAFT - RECIPROCATING ENGINES(S)
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	53	29.0	64.8	31.4
Col. with Object	38	20.8	38.2	18.5
Hard Landing	18	9.8	19.0	9.2
Col. with Ground/Water-Controlled	13	7.1	18.6	9.0
Col. with Ground/Water-Uncontrolled	11	6.0	14.4	7.0
Tail Rotor Failure	10	5.5	14.0	6.8
Roll Over	11	6.0	13.0	6.3
Main Rotor Failure	11	6.0	7.2	3.5
Airframe Failure in Flight	7	3.8	6.0	2.9
(All Other Types)	11	6.0	11.2	5.4
Total	183	100.0	206.4	100.0

Table 81 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ROTORCRAFT - RECIPROCATING ENGINE(S)
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
In Flight	107	58.5	119.2	57.8
Landing	42	23.0	39.4	19.1
Takeoff	24	13.1	37.0	17.9
Taxi	8	4.4	7.4	3.6
Static	1	0.5	2.4	1.2
Not Reported	1	0.5	1.0	0.5
Total	183	100.0	206.4	100.0

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ROTORCRAFT - TURBINE POWERED

Tables 82 through 89 present data for accidents involving turbine powered rotorcraft. The number of such accidents, which increased each year from 1975 through 1979, remained constant at 80 in 1980. Both fatal accidents and fatalities increased in 1980 by more than 30 percent from their 1979 totals. The estimated flight hours for 1980 increased by 76.8 percent from the 1979 estimate, resulting in substantial reductions in accident rates, both total and fatal.

Table 82 - SUMMARY OF LOSSES
ROTORCRAFT - TURBINE POWERED
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	18	13	11
Involved Serious Injury	10	9	10
Involved Minor Injury	19	16	13
Involved No Injury	33	42	26
Total	80	80	60
Fatalities			
Passenger	19	14	6
Crew	14	12	9
Other Persons	2	0	1
Total	35	26	16
Aircraft Damaged*			
Destroyed	26	23	20
Substantial	53	56	38
Minor	0	1	1
None	1	0	1
Total	80	80	60

* Number of Turbine Powered, General Aviation Rotorcraft

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Table 83 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ROTORCRAFT - TURBINE POWERED
1980

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	3	1	4	21	29
Business	4	1	3	3	11
Corporate/Executive	5	3	5	6	19
Aerial Application	0	0	2	2	4
Instructional	0	0	4	7	11
Other	21	18	13	51	103
Total	33	23	31	90	177
Percent	18.6	13.0	17.5	50.8	

Table 84 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ROTORCRAFT - TURBINE POWERED
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Hard Landing	1	0	1	5	7	8.7
Roll Over	0	0	1	3	4	5.0
Col. Between Aircraft-Both in Flight	1	0	0	1	2	2.5
Col. with Ground/Water-Controlled	2	1	0	1	4	5.0
Col. with Ground/Water-Uncontrolled	5	1	2	0	8	10.0
Col. with Wires/Poles	0	3	3	2	8	10.0
Col. with Trees	0	0	1	0	1	1.2
Col. with Building/s	0	0	0	1	1	1.2
Col. with Other	1	0	0	0	1	1.2
Fire or Explosion in Flight	0	0	0	1	1	1.2
Airframe Failure in Flight	0	0	1	2	3	3.7
Engine Failure or Malfunction	2	5	7	12	26	32.5
Tail Rotor Failure	1	0	0	2	3	3.7
Main Rotor Failure	1	0	3	2	6	7.5
Prop/Rotor Accident to Person	2	0	0	0	2	2.5
Miscellaneous/Other	1	0	0	1	2	2.5
Undetermined	1	0	0	0	1	1.2
No. of Accidents	18	10	19	33	80	
Percent	22.5	12.5	23.8	41.2		

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Table 85 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ROTORCRAFT - TURBINE POWERED
1980

Phase of Operation	Degree of Damage			Aircraft	
	Des.	Sub.	None	No.	Percent
Static:					
Idling Rotors	1	0	1	2	2.5
Taxi:					
Other	0	1	0	1	1.2
Aerial Taxi to Takeoff	0	1	0	1	1.2
Takeoff:					
Run	0	1	0	1	1.2
Initial Climb	2	0	0	2	2.5
Vertical	3	6	0	9	11.2
Aborted (Rotorcraft/VTOL)	0	1	0	1	1.2
Inflight:					
Climb to Cruise	0	1	0	1	1.2
Normal Cruise	6	16	0	22	27.5
Hovering	2	5	0	7	8.7
Power-On Descent (Rotorcraft)	0	2	0	2	2.5
Autorotative Descent	0	1	0	1	1.2
Uncontrolled Descent	2	0	0	2	2.5
Low Pass	2	0	0	2	2.5
Other	3	2	0	5	6.2
Swath Run	0	1	0	1	1.2
Procedure Turnaround	0	2	0	2	2.5
Return to Strip	0	1	0	1	1.2
Landing:					
Traffic Pattern-Circling	0	1	0	1	1.2
Final Approach (VFR)	2	1	0	3	3.7
Level Off/Touchdown	0	1	0	1	1.2
Roll-On/Run-On (Rotorcraft)	0	1	0	1	1.2
Power-On Landing (Rotorcraft)	2	6	0	8	10.0
Power-Off Autorotative Ldg	0	2	0	2	2.5
Unknown/Not Reported	1	0	0	1	1.2
No. of Aircraft	26	53	1	80	
Percent	32.5	66.3	1.2		

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Table 86 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ROTORCRAFT - TURBINE POWERED
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	10	12.5
Powerplant-Misc-Failure for Undetermined Reasons	8	10.0
Misc Acts, Conditions-Material Failure	8	10.0
Pilot-Continued VFR Flight into Adverse Weather Cond.	5	6.3
Pilot-Failed to See and Avoid Objects or Obstructions	5	6.3
Pilot-Mismanagement of Fuel	5	6.3
Pilot-Misjudged Clearance	5	6.3
Misc-Undetermined	5	6.3
Misc Acts, Conditions-Fuel Exhaustion	5	6.3
Personnel-Inadequate Maintenance and Inspection	4	5.0
Misc Acts, Conditions-Fuel Starvation	4	5.0

Table 87 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
ROTORCRAFT - TURBINE POWERED
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	47	6	14	12
1976	39	8	14	14
1977	56	8	11	8
1978	60	11	16	15
1979	80	13	26	26
1980	80	18	35	33

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	351,000	13.39	1.71
1976	423,000	9.22	1.89
1977	599,000	9.35	1.34
1978	631,000	9.51	1.74
1979	663,000	12.07	1.96
1980	1,172,000	6.83	1.54

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Table 88 - MOST PREVALENT TYPES OF ACCIDENTS
ROTORCRAFT - TURBINE POWERED
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	26	32.5	15.6	27.7
Col. with Object	11	13.8	10.8	19.1
Hard Landing	7	8.8	5.4	9.6
Roll Over	4	5.0	4.8	8.5
Col. with Ground/Water-Controlled	4	5.0	3.6	6.4
Col. with Ground/Water-Uncontrolled	8	10.0	3.2	5.7
Tail Rotor Failure	3	3.8	3.2	5.7
Misc/Other	2	2.5	2.8	5.0
Airframe Failure in Flight	3	3.8	2.0	3.5
Main Rotor Failure	6	7.5	1.8	3.2
Col. Between Aircraft-Both in Flight	2	2.5	0.6	1.1
Prop/Rotor Accident to Person	2	2.5	0.6	1.1
(All Other Types)	2	2.5	2.0	3.5
Total	80	100.0	56.4	100.0

Table 89 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ROTORCRAFT - TURBINE POWERED
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
In Flight	46	57.5	31.6	56.0
Landing	16	20.0	11.8	20.9
Takeoff	13	16.3	8.4	14.9
Taxi	2	2.5	2.2	3.9
Static	2	2.5	2.0	3.5
Not Reported	1	1.3	0.4	0.7
Total	80	100.0	56.4	100.0

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ALL GLIDERS

Accidents, fatal accidents, and fatalities all increased in 1980 from their 1979 levels. The Federal Aviation Administration does not publish estimated flight hours separately for gliders. Therefore, the extent to which the increases may be related to increased exposure cannot be determined. Tables 90 through 101 contain statistics on accidents involving gliders. In 1980, all ten most prevalent detailed accident causes were pilot-related. The pilot was a cause or factor of 91.9 percent of glider accidents in 1980, compared to 78.8 percent of all accidents.

Table 90 - SUMMARY OF LOSSES
ALL GLIDERS
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	7	3	10
Involved Serious Injury	17	17	9
Involved Minor Injury	8	9	15
Involved No Injury	30	26	32
Total	62	55	66
Fatalities			
Crew	7	3	10
Other Persons	0	0	4
Total	7	3	14
Aircraft Damaged*			
Destroyed	13	11	16
Substantial	49	43	51
Minor	0	1	0
Total	62	55	67

* Number of General Aviation Gliders

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Table 91 - PERSONS BY ROLE AND DEGREE OF INJURY
ALL GLIDERS
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	7	15	10	30	62
Copilot	0	0	0	1	1
Dual Student	0	1	0	1	2
Passengers	0	1	2	3	6
Grand Total	7	17	12	35	71
Percent	9.9	23.9	16.9	49.3	

Table 92 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
ALL GLIDERS
1980

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Personal	6	12	11	28	57
Instructional	1	1	1	7	10
Other	0	4	0	0	4
Total	7	17	12	35	71
Percent	9.9	23.9	16.9	49.3	

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Table 93 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
ALL GLIDERS
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground Loop-Swerve	0	0	0	3	3	4.8
Hard Landing	0	1	1	4	6	9.7
Overshoot	0	0	0	3	3	4.8
Undershoot	0	3	0	5	8	12.9
Col. with Ground/Water-Controlled	0	3	2	1	6	9.7
Col. with Ground/Water-Uncontrolled	3	1	0	0	4	6.4
Col. with Trees	0	1	3	7	11	17.7
Col. with Fence, Fenceposts	0	0	0	2	2	3.2
Col. with Crop	0	0	0	1	1	1.6
Col. with Automobile	0	0	0	1	1	1.6
Col. with Other	0	1	0	1	2	3.2
Stall	0	3	1	1	5	8.1
Stall/Spin	2	4	1	0	7	11.3
Stall/Mush	1	0	0	0	1	1.6
Airframe Failure in Flight	1	0	0	1	2	3.2
No. of Accidents	7	17	8	30	62	
Percent	11.3	27.4	12.9	48.4		

Table 94 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
ALL GLIDERS
1980

Phase of Operation	Degree of Damage		Aircraft	
	Des.	Sub.	No.	Percent
Takeoff:				
Run	0	2	2	3.2
Initial Climb	3	5	8	12.9
Aborted (Fixed-Wing)	1	0	1	1.6
Other	0	1	1	1.6
Inflight:				
Normal Cruise	0	3	3	4.8
Descending	0	1	1	1.6
Acrobatics	2	0	2	3.2
Uncontrolled Descent	1	0	1	1.6
Other	1	1	2	3.2
Landing:				
Traffic Pattern-Circling	0	4	4	6.4
Final Approach (VFR)	2	14	16	25.8
Final Approach (IFR)	1	1	2	3.2
Level Off/Touchdown	1	13	14	22.6
Roll (Fixed Wing)	0	4	4	6.4
Unknown/Not Reported	1	0	1	1.6
No. of Aircraft	13	49	62	
Percent	21.0	79.0		

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Table 95 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
ALL GLIDERS
1980

Light Conditions	Weather	Accidents	
	VFR	No.	Percent
Daylight	62	62	100.00
No. of Accidents	62	62	
Percent	100.0		

Table 96 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
ALL GLIDERS
1980

Proximity to Airport	Flight Plan	Aircraft	
	None	No.	Percent
On Airport	24	24	38.7
In Traffic Pattern	1	1	1.6
Miles from Airport:			
Within 1/4	10	10	16.1
1/4+ to 1/2	2	2	3.2
3/4+ to 1	2	2	3.2
1+ to 2	4	4	6.4
3+ to 4	1	1	1.6
Beyond 5	13	13	21.0
Unknown/Not Reported	5	5	8.1
No. of Aircraft	62	62	
Percent	100.0		

Table 97 - MOST PREVALENT DETAILED ACCIDENT CAUSES
ALL GLIDERS
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Improper In-Flight Decision or Planning	14	22.6
Pilot-Failed to Obtain/Maintain Flying Speed	11	17.7
Pilot-Misjudged Distance and Altitude	6	9.7
Pilot-Improper Operation of Flight Controls	4	6.5
Pilot-Improper Level Off	4	6.5
Pilot-Selected Unsuitable Terrain	4	6.5
Pilot-Misjudged Altitude and Clearance	4	6.5
Pilot-Improper Compensation for Wind Conditions	3	4.8
Pilot-Misjudged Distance and Speed	3	4.8
Pilot-Misjudged Clearance	3	4.8

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Table 98 - ACCIDENTS, FATAL ACCIDENTS, AND FATALITIES
ALL GLIDERS
1975 - 1980

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard General Aviation Gliders
1975	82	7	11	9
1976	65	8	9	8
1977	78	7	8	8
1978	66	10	14	10
1979	55	3	3	3
1980	62	7	7	7

* The yearly accident counts include suicide and sabotage accidents as follows:
Total - 1975 (1)
Fatal - 1975 (1)

Table 99 - MOST PREVALENT TYPES OF ACCIDENTS
ALL GLIDERS
1980 AND 1975 - 1979

Type of Accident	1980		1975 - 1979	
	No.	Percent	Mean	Percent
Col. with Object	17	27.4	18.8	27.2
Undershoot	8	12.9	13.2	19.1
Stall/Spin	7	11.3	6.0	8.7
Col. with Ground/Water-Controlled	6	9.7	4.4	6.4
Overshoot	3	4.8	4.2	6.1
Stall	5	8.1	3.8	5.5
Ground Loop-Swerve	3	4.8	3.8	5.5
Hard Landing	6	9.7	3.4	4.9
Airframe Failure in Flight	2	3.2	2.4	3.5
Misc/Other	0	0.0	2.4	3.5
Col. with Ground/Water-Uncontrolled	4	6.5	1.8	2.6
Col. Between Aircraft-Both in Flight	0	0.0	1.4	2.0
Stall/Spiral	0	0.0	1.0	1.4
Stall/Mush	1	1.6	1.0	1.4
(All Other Types)	0	0.0	1.6	2.3
Total	62	100.0	69.2	100.0

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Table 100 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
ALL GLIDERS
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
Landing	40	64.5	50.2	72.1
In Flight	9	14.5	10.4	14.9
Takeoff	12	19.4	8.4	12.1
Not Reported	1	1.6	0.4	0.6
Taxi	0	0.0	0.2	0.3
Total	62	100.0	69.6	100.0

Table 101 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
ALL GLIDERS
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	57	91.9	61.2	88.4
Terrain	13	20.9	19.6	28.3
Weather	22	35.4	17.4	25.1
Personnel	1	1.6	7.6	10.9
Miscellaneous	2	3.2	4.2	6.0
Instruments/Equipment and Accessories	3	4.8	2.0	2.8
Undetermined	1	1.6	1.8	2.6
Airframe	3	4.8	1.6	2.3
Systems	1	1.6	1.4	2.0
Airport/Airways/Facilities	0	0.0	1.4	2.0
No. of Accidents with Cause(s) Assigned	62		69.2	

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PERSONAL FLYING

Data relative to personal flying accidents are presented in Tables 102 through 112. In 1980, these accidents accounted for 56.9 percent of the total, 63.2 percent of fatal accidents, and 65.6 percent of fatalities in U.S. general aviation. The proportion of persons aboard accident-involved personal flying aircraft who received minor or no injuries was 72.5 percent - similar to the proportion for all accidents.

Accident rates have not been computed separately for personal flying. The Safety Board has determined that accurate accident rates cannot be computed separately for the personal and business flying categories because no reliable breakdown of exposure data (flying hours) is available for each category. A more thorough discussion of the Safety Board's rationale may be found in Appendix C. Accident rates have been computed for personal and business flying combined and may be found in the next section of this report.

Table 102 - SUMMARY OF LOSSES
PERSONAL FLYING
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	393	418	461
Involved Serious Injury	231	221	265
Involved Minor Injury	302	352	364
Involved No Injury	1120	1219	1287
Total	2046	2210	2377
Fatalities			
Passenger	427	413	504
Crew	385	406	443
Other Persons	9	13	11
Total	821	832	958
Aircraft Damaged*			
Destroyed	561	568	621
Substantial	1477	1618	1753
Minor	8	16	14
None	11	18	10
Total	2057	2220	2398

* Number of General Aviation Aircraft in Personal Operations

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Table 103 - PERSONS BY ROLE AND DEGREE OF INJURY
PERSONAL FLYING
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	365	215	275	1204	2059
Copilot	15	2	6	19	42
Dual Student	3	1	1	3	8
Extra Crew	2	0	1	0	3
Passengers	427	172	314	1347	2260
Total Aboard	812	390	597	2573	4372
Other Aircraft*	7	4	0	29	40
Other Ground	2	8	13	10	33
Grand Total	821	402	610	2612	4445
Percent	18.5	9.0	13.7	58.8	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

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Table 104 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
PERSONAL FLYING
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	0	5	23	192*	220*	10.8
Dragged Wingtip Pod or Float	1	0	0	3	4	0.2
Wheels-up Landing	0	1	1	48	50	2.4
Wheels-down Landing in Water	1	0	0	1	2	0.1
Gear Collapsed	0	2	3	25	30	1.5
Gear Retracted	0	0	0	17	17	0.8
Hard Landing	2	7	13	115	137	6.7
Nose Over/Down	0	1	5	37	43	2.1
Roll Over	0	1	2	1	4	0.2
Overshoot	7	10	17	90	124	6.1
Undershoot	4	8	7	41	60	2.9
Col. Between Aircraft-Both in Flight	9	1	0	0	10	0.5
Col. Between Aircraft-One Airborne	1	0	1	3	5	0.2
Col. Between Aircraft-Both on Ground	0	0	0	5*	5*	0.2
Col. with Ground/Water-Controlled	71	8	15	23	117	5.7
Col. with Ground/Water-Uncontrolled	71	3	7	5	86	4.2
Col. with Wires/Poles	17	12	13	29	71	3.5
Col. with Trees	42	13	27	42	124	6.1
Col. with Building/s	0	0	2	3	5	0.2
Col. with Fence, Fenceposts	0	1	4	17	22	1.1
Col. with Electronic Towers	2	0	0	0	2	0.1
Col. with Runway or Approach Lights	0	0	1	7	8	0.4
Col. with Airport Hazard	0	0	1	6	7	0.3
Col. with Animals	1	0	0	3	4	0.2
Col. with Crop	0	0	0	4	4	0.2
Col. with Ditches	1	1	4	17	23	1.1
Col. with Snowbank	0	0	1	8	9	0.4
Col. with Parked Aircraft (Unattended)	0	0	3	8	11	0.5
Col. with Automobile	0	0	0	4	4	0.2
Col. with Dirt Bank	0	2	2	8	12	0.6
Col. with Other	2	4	2	28	36	1.8
Bird Strike	0	0	0	2	2	0.1
Stall	22	23	11	25	81	4.0
Stall/Spin	39	6	3	0	48	2.3
Stall/Spiral	1	1	1	0	3	0.1
Stall/Mush	10	12	13	28	63	3.1
Fire or Explosion in Flight	1	0	2	2	5	0.2
Fire or Explosion on Ground	0	0	0	4	4	0.2
Airframe Failure in Flight	27	3	3	9	42	2.1
Airframe Failure on Ground	0	0	0	5	5	0.2

* In one collision between aircraft, one of the two aircraft involved experienced a ground loop-swerve, before colliding with the other aircraft. This accident is tallied with both accident types, but is counted as only one accident in the totals at the end of the table.

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Table 104 (continued)

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Engine Failure or Malfunction	44	98	109	244	495	24.2
Propeller/Rotor Failure	0	0	0	1	1	0.0
Propeller Failure	0	1	1	5	7	0.3
Tail Rotor Failure	1	0	0	0	1	0.0
Main Rotor Failure	1	0	1	0	2	0.1
Prop/Rotor Accident to Person	2	4	0	0	6	0.3
Propeller/Jet/Rotor Blast	0	0	1	2	3	0.1
Turbulence	0	1	1	0	2	0.1
Missing Aircraft Not Recovered	10	0	0	0	10	0.5
Miscellaneous/Other	0	2	2	4	8	0.4
Undetermined	3	0	0	0	3	0.1
No. of Accidents	393	231	302	1120	2046	
Percent	19.2	11.3	14.8	54.7		

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Table 105 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
PERSONAL FLYING
1980

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Minor	None	No.	Percent
Static:						
Starting Engine/s	1	1	1	0	3	0.1
Idling Engine/s	0	2	0	3	5	0.2
Idling Rotors	0	0	0	1	1	0.0
Taxi:						
To Takeoff	0	26	1	0	27	1.3
From Landing	1	26	0	1	28	1.4
Other	0	12	0	0	12	0.6
Ground Taxi from Landing	0	1	0	0	1	0.0
Aerial Taxi to/from Landing	0	1	0	0	1	0.0
Aerial Taxi, Other	0	1	0	0	1	0.0
Takeoff:						
Run	6	72	0	0	78	3.8
Initial Climb	80	205	2	0	287	14.0
Vertical	0	4	0	0	4	0.2
Running (Rotorcraft/VTOL-STOL)	0	1	0	0	1	0.0
Aborted (Fixed-Wing)	4	36	0	0	40	1.9
Aborted (Rotorcraft/VTOL)	0	2	0	0	2	0.1
Other	0	2	0	1	3	0.1
Inflight:						
Climb to Cruise	14	34	1	0	49	2.4
Normal Cruise	107	182	0	0	289	14.0
Descending	21	29	0	0	50	2.4
Holding (IFR)	1	0	0	0	1	0.0
Hovering	2	2	0	0	4	0.2
Power-On Descent (Rotorcraft)	0	1	0	0	1	0.0
Acrobatics	33	6	1	0	40	1.9
Buzzing	25	7	0	0	32	1.6
Uncontrolled Descent	45	9	0	0	54	2.6
Low Pass	28	24	0	0	52	2.5
Other	30	27	0	0	57	2.8
Landing:						
Traffic Pattern-Circling	26	21	0	0	47	2.3
Final Approach (VFR)	34	111	0	1	146	7.1
Initial Approach	9	0	0	0	9	0.4
Final Approach (IFR)	13	5	0	0	18	0.9
Level Off/Touchdown	33	350	0	4	387	18.8
Roll (Fixed Wing)	4	225	2	0	231	11.2
Power-On Landing (Rotorcraft)	1	5	0	0	6	0.3
Go-Around (VFR)	27	42	0	0	69	3.4
Missed Approach (IFR)	2	0	0	0	2	0.1
Other	1	3	0	0	4	0.2
Unknown/Not Reported	13	2	0	0	15	0.7
No. of Aircraft	561	1477	8	11	2057	
Percent	27.3	71.8	0.4	0.5		

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Table 106 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
PERSONAL FLYING
1980

Condition of Light	Type of Weather				Accidents	
	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	14	3	0	0	17	0.8
Daylight	1569	86	6	7	1668	81.5
Dusk	78	17	0	5	100	4.9
Night (Dark)	140	58	6	12	216	10.6
Night (Moonlight-Bright)	34	1	0	0	35	1.7
Unknown/Not Reported	4	0	0	6	10	0.5
No. of Accidents	1839	165	12	30	2046	
Percent	89.9	8.1	0.6	1.5		

Table 107 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
PERSONAL FLYING
1980

Proximity to Airport	Flight Plan								Aircraft	
	None	VFR	IFR	IFR (VFR Cond. on Top)	DVFR	Special VFR	Unk/NR	Other	No.	Percent
On Airport	783	87	44	0	0	0	9	0	923	44.9
On Seaplane Base	9	1	0	0	0	0	0	0	10	0.5
In Traffic Pattern	65	8	3	0	0	0	0	0	76	3.7
Miles from Airport:										
Within 1/4	128	7	9	0	0	1	1	0	146	7.1
1/4+ to 1/2	54	3	4	0	0	0	0	0	61	3.0
1/2+ to 3/4	18	2	0	0	0	0	0	0	20	1.0
3/4+ to 1	49	1	3	0	1	0	0	0	54	2.6
1+ to 2	44	9	3	0	0	0	0	1	57	2.8
2+ to 3	18	2	4	0	0	0	0	1	25	1.2
3+ to 4	19	1	3	0	0	0	1	0	24	1.2
4+ to 5	16	3	2	1	0	0	0	0	22	1.1
Beyond 5	424	60	32	1	0	2	1	4	524	25.5
Unknown/Not Reported	98	11	4	1	0	0	0	0	114	5.5
Other	1	0	0	0	0	0	0	0	1	0.0
No. of Aircraft	1726	195	111	3	1	3	12	6	2057	
Percent	83.9	9.5	5.4	0.1	0.0	0.1	0.6	0.3		

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Table 108 - MOST PREVALENT DETAILED ACCIDENT CAUSES
PERSONAL FLYING
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	245	12.0
Pilot-Failed to Obtain/Maintain Flying Speed	212	10.4
Pilot-Mismanagement of Fuel	154	7.5
Misc Acts, Conditions-Fuel Exhaustion	130	6.4
Pilot-Misjudged Distance and Speed	123	6.0
Pilot-Selected Unsuitable Terrain	113	5.5
Powerplant-Misc-Failure for Undetermined Reasons	110	5.4
Pilot-Improper Level Off	110	5.4
Pilot-Continued VFR Flight into Adverse Weather Cond.	85	4.2
Misc Acts, Conditions-Material Failure	83	4.1

Table 109 - ACCIDENTS, FATAL ACCIDENTS, AND FATALITIES
PERSONAL FLYING
1975 - 1980

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard Aircraft in this Category
1975	2231	416	880	866
1976	2338	432	854	839
1977	2282	439	893	878
1978	2377	461	958	947
1979	2210	418	832	819
1980	2046	393	821	812

* The yearly accident counts include suicide and sabotage accidents as follows:
Total - 1975 (2), 1976 (1), 1978 (2), 1980 (1)
Fatal - 1975 (2), 1978 (2), 1980 (1)

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Table 110 - MOST PREVALENT TYPES OF ACCIDENTS
PERSONAL FLYING
1980 AND 1975 - 1979

Type of Accident	1980 No.	1980 Percent	1975 - 1979 Mean	1975 - 1979 Percent
Engine Failure or Malfunction	495	24.2	532.4	23.3
Col. with Object	342	16.7	335.6	14.7
Ground-Water Loop-Swerve	220	10.8	294.6	12.9
Hard Landing	137	6.7	140.2	6.1
Overshoot	124	6.1	124.2	5.4
Col. with Ground/Water-Controlled	117	5.7	123.0	5.4
Stall/Mush	63	3.1	95.2	4.2
Col. with Ground/Water-Uncontrolled	86	4.2	94.6	4.1
Nose Over/Down	43	2.1	80.2	3.5
Undershoot	60	2.9	79.4	3.5
Stall	81	4.0	77.6	3.4
Stall/Spin	48	2.3	57.8	2.5
Wheels-up Landing	50	2.4	39.4	1.7
Airframe Failure in Flight	42	2.1	38.6	1.7
Gear Collapsed	30	1.5	27.6	1.2
(All Other Types)	108	5.3	147.2	6.4
Total	2046	100.0	2287.6	100.0

Table 111 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
PERSONAL FLYING
1980 AND 1975 - 1979

Phase of Operation	1980 No.	1980 Percent	1975 - 1979 Mean	1975 - 1979 Percent
Landing	919	44.7	1017.0	44.2
In Flight	629	30.6	713.4	31.0
Takeoff	415	20.2	454.8	19.8
Taxi	70	3.4	86.8	3.8
Not Reported	15	0.7	15.0	0.7
Static	9	0.4	14.4	0.6
Total	2057	100.0	2301.4	100.0

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Table 112 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
PERSONAL FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	1691	82.6	1933.2	84.5
Terrain	418	20.4	580.0	25.4
Weather	543	26.5	574.4	25.1
Powerplant	277	13.5	295.4	12.9
Airport/Airways/Facilities	155	7.6	195.6	8.6
Personnel	170	8.3	187.0	8.2
Landing Gear	81	4.0	82.0	3.6
Miscellaneous	86	4.2	79.0	3.5
Undetermined	39	1.9	42.2	1.8
Systems	29	1.4	29.0	1.3
Airframe	38	1.9	26.0	1.1
Instruments/Equipment and Accessories	10	0.5	10.4	0.5
Rotorcraft	7	0.3	6.2	0.3
No. of Accidents with Cause(s) Assigned	2046		2287.6	

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PERSONAL AND BUSINESS FLYING, COMBINED DATA

This section contains only one table and presents accidents, fatal accidents, fatalities, and accident rates for personal flying and business flying combined (see table 113). In previous editions of this annual review, accident rates were reported for each of these categories separately. Overreporting of business flying hours (and the resulting underreporting of personal flying hours) would result in distortion of the rates if computed separately for personal and business flyers. For a complete discussion of the Safety Board's rationale for reporting a combined accident rate, see Appendix C. Although the Safety Board reports a single accident rate for personal and business flying combined, it should not be inferred that separate accident rates for these two categories would be equal if sufficiently accurate exposure data were available to permit their computation.

Table 113 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
PERSONAL AND BUSINESS FLYING COMBINED
1975 - 1980

			Fatalities	
Year	Accidents	Fatal Accidents	Total	Aboard Aircraft in this Category
1975	2548	480	1000	986
1976	2633	494	960	943
1977	2581	489	977	967
1978	2657	523	1067	1056
1979	2465	474	944	929
1980	2292	454	937	928

		Accident Rate per 100,000* Aircraft Hours Flown	
Year	Hours Flown	Total	Fatal
1975	15,832,000	16.08	3.02
1976	16,850,000	15.61	2.93
1977	16,727,000	15.43	2.92
1978	19,322,000	13.74	2.70
1979	20,638,000	11.94	2.30
1980	19,374,000	11.83	2.34

* Suicide and sabotage accidents excluded from rates as follows:
Total - 1975 (2), 1976 (3), 1978 (2), 1980 (1)
Fatal - 1975 (2), 1976 (1), 1978 (2), 1980 (1)

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BUSINESS FLYING

Tables 114 through 124 present data for accidents involving aircraft being operated for business purposes. There were 247 such accidents in 1980, down 15.1 percent from the average (290.8 accidents) for the prior five years. Among the accident types with decreased frequencies in 1980, the "gear collapsed" type showed the greatest relative reduction, one accident in 1980 compared to a mean of 7.0 accidents per year in 1975 through 1979. The greatest relative increase in the number of accidents was for the "controlled collision with ground/water" type. The 20 accidents of this type represent a 47.1 percent increase from the base-period mean of 13.6 per year.

Accident rates have not been computed separately for business flying. The Safety Board has determined that accurate accident rates cannot be computed separately for the personal and business flying categories because no reliable breakdown of exposure data (flying hours) is available for each category. A more thorough discussion of the Safety Board's rationale may be found in Appendix C. Combined personal and business flying accident rates may be found in the previous section of this report (See Table 113).

Table 114 - SUMMARY OF LOSSES
BUSINESS FLYING
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	62	56	62
Involved Serious Injury	24	23	28
Involved Minor Injury	30	25	38
Involved No Injury	131	151	153
Total	247	255	281
Fatalities			
Passenger	55	53	49
Crew	61	57	60
Other Persons	10	2	0
Total	126	112	109
Aircraft Damaged*			
Destroyed	79	74	78
Substantial	167	180	201
Minor	0	2	2
None	1	0	0
Total	247	256	281

* Number of General Aviation Aircraft in Business Operations

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Table 115 - PERSONS BY ROLE AND DEGREE OF INJURY
BUSINESS FLYING
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	58	23	25	141	247
Copilot	3	1	2	1	7
Passengers	55	29	25	119	228
Total Aboard	116	53	52	261	482
Other Aircraft*	10	0	0	0	10
Grand Total	126	53	52	261	492
Percent	25.6	10.8	10.6	53.0	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

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Table 116 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
BUSINESS FLYING
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	1	1	2	14	18	7.3
Dragged Wingtip Pod or Float	0	0	0	1	1	0.4
Wheels-up Landing	0	0	0	8	8	3.2
Gear Collapsed	0	0	0	1	1	0.4
Gear Retracted	0	0	0	5	5	2.0
Hard Landing	1	0	0	13	14	5.7
Nose Over/Down	0	0	0	4	4	1.6
Roll Over	0	0	1	0	1	0.4
Overshoot	0	1	4	13	18	7.3
Undershoot	1	0	1	5	7	2.8
Col. Between Aircraft-Both in Flight	3	0	0	0	3	1.2
Col. with Ground/Water-Controlled	14	2	1	3	20	8.1
Col. with Ground/Water-Uncontrolled	13	0	1	0	14	5.7
Col. with Wires/Poles	2	0	0	2	4	1.6
Col. with Trees	6	5	1	3	15	6.1
Col. with Ditches	0	0	0	1	1	0.4
Col. with Snowbank	0	0	0	1	1	0.4
Col. with Parked Aircraft (Unattended)	0	0	0	2	2	0.8
Col. with Dirt Bank	0	1	1	3	5	2.0
Col. with Other	1	0	0	4	5	2.0
Stall	1	0	2	0	3	1.2
Stall/Spin	2	0	0	0	2	0.8
Stall/Mush	0	0	3	1	4	1.6
Fire or Explosion on Ground	0	0	0	1	1	0.4
Airframe Failure in Flight	5	0	0	0	5	2.0
Airframe Failure on Ground	0	0	0	1	1	0.4
Engine Failure or Malfunction	10	14	12	37	73	29.5
Propeller Failure	0	0	0	2	2	0.8
Tail Rotor Failure	0	0	0	1	1	0.4
Main Rotor Failure	0	0	0	1	1	0.4
Prop/Rotor Accident to Person	1	0	0	0	1	0.4
Propeller/Jet/Rotor Blast	0	0	0	2	2	0.8
Turbulence	0	0	1	2	3	1.2
Undetermined	1	0	0	0	1	0.4
No. of Accidents	62	24	30	131	247	
Percent	25.1	9.7	12.1	53.1		

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Table 117 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
BUSINESS FLYING
1980

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	None	Unk/ NR	No.	Percent
Static:						
Starting Engine/s	0	0	1	0	1	0.4
Taxi:						
To Takeoff	0	5	0	0	5	2.0
From Landing	0	3	0	0	3	1.2
Other	0	2	0	0	2	0.8
Takeoff:						
Run	1	4	0	0	5	2.0
Initial Climb	13	10	0	0	23	9.3
Vertical	1	0	0	0	1	0.4
Aborted (Fixed-Wing)	0	2	0	0	2	0.8
Aborted (Rotorcraft/VTOL)	0	1	0	0	1	0.4
Inflight:						
Climb to Cruise	3	3	0	0	6	2.4
Normal Cruise	24	28	0	0	52	21.0
Descending	3	5	0	0	8	3.2
Hovering	1	0	0	0	1	0.4
Acrobatics	1	0	0	0	1	0.4
Buzzing	1	0	0	0	1	0.4
Uncontrolled Descent	10	1	0	0	11	4.4
Low Pass	3	1	0	0	4	1.6
Other	3	2	0	0	5	2.0
Landing:						
Traffic Pattern-Circling	2	3	0	0	5	2.0
Final Approach (VFR)	3	16	0	0	19	7.7
Initial Approach	1	0	0	0	1	0.4
Final Approach (IFR)	4	5	0	0	9	3.6
Level Off/Touchdown	1	45	0	0	46	18.6
Roll (Fixed Wing)	1	24	0	0	25	10.1
Power-On Landing (Rotorcraft)	1	3	0	0	4	1.6
Go-Around (VFR)	1	4	0	0	5	2.0
Unknown/Not Reported	0	0	0	1	1	0.4
No. of Aircraft	78	167	1	1	247	
Percent	31.6	67.6	0.4	0.4		

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Table 118 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
BUSINESS FLYING
1980

Condition of Light	Type of Weather				Accidents	
	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	1	1	0	0	2	0.8
Daylight	172	20	0	1	193	78.1
Dusk	4	3	0	0	7	2.8
Night (Dark)	17	19	2	1	39	15.8
Night (Moonlight-Bright)	4	1	0	0	5	2.0
Unknown/Not Reported	0	1	0	0	1	0.4
No. of Accidents	198	45	2	2	247	
Percent	80.2	18.2	0.8	0.8		

Table 119 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
BUSINESS FLYING
1980

Proximity to Airport	Flight Plan							Aircraft	
	None	VFR	IFR	IFR (VFR cond. on Top)	VFR Flight Following	Unk/NR	Other	No.	Percent
On Airport	70	10	16	0	0	0	0	96	38.9
On Heliport	2	0	0	0	0	0	0	2	0.8
On Barge/Ship/Platform	1	0	0	0	0	0	0	1	0.4
In Traffic Pattern	4	3	1	0	0	0	0	8	3.2
Miles from Airport:									
Within 1/4	7	3	1	0	0	0	0	11	4.4
1/4+ to 1/2	3	2	3	0	0	1	0	9	3.6
1/2+ to 3/4	0	1	0	0	0	0	0	1	0.4
3/4+ to 1	5	0	2	0	0	0	1	8	3.2
1+ to 2	1	0	4	0	0	0	0	5	2.0
2+ to 3	8	1	4	0	0	0	0	13	5.3
3+ to 4	2	1	1	0	0	0	0	4	1.6
4+ to 5	0	0	1	0	0	0	0	1	0.4
Beyond 5	56	7	8	1	1	0	1	74	30.0
Unknown/Not Reported	12	0	2	0	0	0	0	14	5.7
No. of Aircraft	171	28	43	1	1	1	2	247	
Percent	69.2	11.4	17.4	0.4	0.4	0.4	0.8		

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Table 120 - MOST PREVALENT DETAILED ACCIDENT CAUSES
BUSINESS FLYING
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Preflight Prep. and/or Planning	34	13.8
Pilot-Continued VFR Flight into Adverse Weather Cond.	23	9.3
Pilot-Mismanagement of Fuel	21	8.5
Misc Acts, Conditions-Material Failure	21	8.5
Pilot-Misjuded Distance and Speed	19	7.7
Misc Acts, Conditions-Fuel Exhaustion	15	6.1
Powerplant-Misc-Failure for Undetermined Reasons	14	5.7
Pilot-Selected Unsuitable Terrain	13	5.3
Pilot-Failed to Initiate Go-Around	12	4.9
Misc Acts, Conditions-Fuel Starvation	11	4.5
Pilot-Failed to Follow Appr. Procedures, Directives, Etc.	10	4.0
Pilot-Spatial Disorientation	10	4.0

Table 121 - ACCIDENTS, FATAL ACCIDENTS, AND FATALITIES
BUSINESS FLYING
1975 - 1980

Year	Accidents*	Fatal Accidents*	Fatalities	
			Total	Aboard Aircraft in this Category
1975	318	64	120	120
1976	298	62	106	104
1977	302	53	95	89
1978	281	62	109	109
1979	255	56	112	110
1980	247	62	126	116

* The yearly accident counts include suicide and sabotage accidents as follows:
Total - 1976 (2)
Fatal - 1976 (1)

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Table 122 - MOST PREVALENT TYPES OF ACCIDENTS
BUSINESS FLYING
1980 AND 1975 - 1979

Type of Accident	1980 No.	1980 Percent	1975 - 1979 Mean	1975 - 1979 Percent
Engine Failure or Malfunction	73	29.6	70.2	24.1
Col. with Object	33	13.4	44.2	15.2
Ground-Water Loop-Swerve	18	7.3	29.8	10.2
Overshoot	18	7.3	18.0	6.2
Col. with Ground/Water-Uncontrolled	14	5.7	16.2	5.6
Col. with Ground/Water-Controlled	20	8.1	13.6	4.7
Wheels-up Landing	8	3.2	12.6	4.3
Hard Landing	14	5.7	10.4	3.6
Nose Over/Down	4	1.6	8.2	2.8
Stall/Mush	4	1.6	7.8	2.7
Undershoot	7	2.8	7.0	2.4
Gear Collapsed	1	0.4	7.0	2.4
Gear Retracted	5	2.0	7.0	2.4
Stall	3	1.2	6.0	2.1
Airframe Failure in Flight	5	2.0	5.0	1.7
Col. Between Aircraft-Both in Flight	3	1.2	3.2	1.1
Propeller Failure	2	0.8	3.0	1.0
(All Other Types)	15	6.1	21.6	7.4
Total	247	100.0	290.8	100.0

Table 123 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
BUSINESS FLYING
1980 AND 1975 - 1979

Phase of Operation	1980 No.	1980 Percent	1975 - 1979 Mean	1975 - 1979 Percent
Landing	114	46.2	135.0	46.3
In Flight	89	36.0	92.2	31.6
Takeoff	32	13.0	47.0	16.1
Taxi	10	4.0	14.0	4.8
Static	1	0.4	2.0	0.7
Not Reported	1	0.4	1.2	0.4
Total	247	100.0	291.4	100.0

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Table 124 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
BUSINESS FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	194	78.5	236.0	81.1
Weather	77	31.1	81.8	28.1
Terrain	59	23.8	71.0	24.4
Powerplant	48	19.4	43.0	14.7
Airport/Airways/Facilities	9	3.6	32.2	11.0
Personnel	24	9.7	31.2	10.7
Landing Gear	10	4.0	17.8	6.1
Miscellaneous	9	3.6	11.0	3.7
Systems	4	1.6	6.0	2.0
Undetermined	7	2.8	5.8	1.9
Rotorcraft	3	1.2	2.6	0.8
Airframe	5	2.0	2.2	0.7
Instruments/Equipment and Accessories	1	0.4	1.0	0.3
No. of Accidents with Cause(s) Assigned	247		290.8	

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CORPORATE/EXECUTIVE FLYING

This section presents in Tables 125 through 135 tabulations of data describing corporate/executive flying accidents. Among the five general kinds of flying for which data is presented in this annual review, only in the corporate/executive category were there more accidents in 1980 than the average for the prior five years. However, the upward trend in accidents corresponds closely to increasing activity. The overall accident rate for the period 1975 - 1979 was 1.71, only slightly lower than the 1980 accident rate of 1.79 per 100,000 hours flown. The fatal accident rate in 1980 (0.39) shows a small improvement over the 0.43 rate for the prior five years.

Table 125 - SUMMARY OF LOSSES
CORPORATE/EXECUTIVE FLYING
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	21	15	24
Involved Serious Injury	11	4	9
Involved Minor Injury	10	10	7
Involved No Injury	54	49	48
Total	96	78	88
Fatalities			
Passenger	42	33	35
Crew	21	18	32
Other Persons	3	6	3
Total	66	57	70
Aircraft Damaged*			
Destroyed	32	20	30
Substantial	61	58	56
Minor	2	0	2
None	1	0	0
Total	96	78	88

* Number of General Aviation Aircraft in Corporate/Executive Operations

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Table 126 - PERSONS BY ROLE AND DEGREE OF INJURY
CORPORATE/EXECUTIVE FLYING
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	17	8	10	61	96
Copilot	4	1	0	15	20
Dual Student	0	0	0	1	1
Extra Crew	0	0	0	1	1
Passengers	42	23	22	129	216
Total Aboard	63	32	32	207	334
Other Aircraft*	2	0	0	3	5
Other Ground	1	0	0	0	1
Grand Total	66	32	32	210	340
Percent	19.4	9.4	9.4	61.8	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

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Table 127 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
CORPORATE/EXECUTIVE FLYING
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	0	0	0	7	7	7.3
Wheels-up Landing	0	0	0	8	8	8.3
Wheels-down Landing in Water	0	0	0	1	1	1.0
Gear Collapsed	0	0	0	2	2	2.1
Gear Retracted	0	0	0	2	2	2.1
Hard Landing	0	0	0	4	4	4.2
Nose Over/Down	0	0	0	1	1	1.0
Overshoot	0	0	0	2	2	2.1
Undershoot	0	0	0	2	2	2.1
Col. Between Aircraft-Both in Flight	2	0	0	0	2	2.1
Col. Between Aircraft-One Airborne	0	0	0	1	1	1.0
Col. with Ground/Water-Controlled	7	1	2	0	10	10.4
Col. with Ground/Water-Uncontrolled	3	0	0	0	3	3.1
Col. with Wires/Poles	1	2	1	0	4	4.2
Col. with Trees	1	0	1	0	2	2.1
Col. with Snowbank	0	0	0	1	1	1.0
Col. with Other	0	0	1	2	3	3.1
Bird Strike	0	0	0	2	2	2.1
Stall	2	0	0	0	2	2.1
Stall/Mush	1	2	0	2	5	5.2
Fire or Explosion in Flight	0	0	1	0	1	1.0
Fire or Explosion on Ground	0	0	0	2	2	2.1
Airframe Failure in Flight	1	0	0	4	5	5.2
Engine Failure or Malfunction	1	3	4	11	19	19.8
Propeller Failure	0	1	0	0	1	1.0
Main Rotor Failure	1	0	0	0	1	1.0
Prop/Rotor Accident to Person	1	2	0	0	3	3.1
No. of Accidents	21	11	10	54	96	
Percent	21.9	11.5	10.4	56.2		

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Table 128 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
CORPORATE/EXECUTIVE FLYING
1980

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Minor	None	No.	Percent
Static:						
Starting Engine/s	1	1	1	0	3	3.1
Idling Engine/s	0	2	0	1	3	3.1
Taxi:						
To Takeoff	0	1	0	0	1	1.0
Takeoff:						
Run	1	5	0	0	6	6.2
Initial Climb	5	5	0	0	10	10.4
Inflight:						
Climb to Cruise	0	4	0	0	4	4.2
Normal Cruise	7	8	0	0	15	15.6
Descending	2	4	0	0	6	6.2
Uncontrolled Descent	4	0	0	0	4	4.2
Landing:						
Final Approach (VFR)	3	2	0	0	5	5.2
Initial Approach	1	1	0	0	2	2.1
Final Approach (IFR)	2	1	0	0	3	3.1
Level Off/Touchdown	0	17	1	0	18	18.7
Roll (Fixed Wing)	0	8	0	0	8	8.3
Power-On Landing (Rotorcraft)	0	2	0	0	2	2.1
Go-Around (VFR)	4	0	0	0	4	4.2
Missed Approach (IFR)	2	0	0	0	2	2.1
No. of Aircraft	32	61	2	1	96	
Percent	33.3	63.5	2.1	1.0		

Table 129 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
CORPORATE/EXECUTIVE FLYING
1980

Condition of Light	Type of Weather				Accidents	
	VFR	IFR	Below Minimum	Unk/ NR	No.	Percent
Dawn	2	0	0	0	2	2.1
Daylight	52	10	3	1	66	68.7
Dusk	6	2	0	0	8	8.3
Night (Dark)	9	6	3	0	18	18.7
Night (Moonlight-Bright)	2	0	0	0	2	2.1
No. of Accidents	71	18	6	1	96	
Percent	74.0	18.8	6.2	1.0		

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Table 130 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
CORPORATE/EXECUTIVE FLYING
1980

Proximity to Airport	Flight Plan					Aircraft	
	None	VFR	IFR	Unk/ NR	Other	No.	Percent
On Airport	22	0	18	2	0	42	43.7
On Seaplane Base	2	0	0	0	0	2	2.1
In Traffic Pattern	0	0	1	0	0	1	1.0
Miles from Airport:							
Within 1/4	1	0	4	0	0	5	5.2
1/4+ to 1/2	1	1	1	0	0	3	3.1
3/4+ tp 1	0	0	1	0	0	1	1.0
1+ to 2	4	0	1	0	0	5	5.2
2+ to 3	0	0	2	0	0	2	2.1
3+ to 4	0	0	1	0	0	1	1.0
4+ to 5	0	0	1	0	0	1	1.0
Beyond 5	14	1	14	0	0	29	30.2
Unknown/Not Reported	3	0	0	0	1	4	4.2
No. of Aircraft	47	2	44	2	1	96	
Percent	49.0	2.1	45.8	2.1	1.0		

Table 131 - MOST PREVALENT DETAILED ACCIDENT CAUSES
CORPORATE/EXECUTIVE FLYING
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Misc Acts, Conditions-Material Failure	14	14.6
Pilot-Improper IFR Operations	7	7.3
Powerplant-Failure for Undetermined Reasons	7	7.3
Pilot-Failed to Obtain/Maintain Flying Speed	6	6.3
Pilot-Inadequate Preflight Prep. and/or Planning	5	5.2
Personnel-Inadequate Maintenance and Inspection	4	4.2
Misc Acts, Conditions-Fatigue Fracture	4	4.2
Misc Acts, Conditions-Fuel Exhaustion	4	4.2

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Table 132 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
CORPORATE/EXECUTIVE FLYING
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	63	17	44	44
1976	56	14	42	38
1977	59	18	51	49
1978	88	24	70	67
1979	78	15	57	51
1980	96	21	66	63

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	3,262,000	1.93	0.52
1976	3,396,000	1.65	0.41
1977	3,501,000	1.69	0.51
1978	4,898,000	1.80	0.49
1979	5,022,000	1.55	0.30
1980	5,351,000	1.79	0.39

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Table 133- MOST PREVALENT TYPES OF ACCIDENTS
CORPORATE/EXECUTIVE FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Col. with Object	10	10.4	14.0	20.3
Engine Failure or Malfunction	19	19.8	13.4	19.5
Col. with Ground/Water-Controlled	10	10.4	4.8	7.0
Ground-Water Loop-Swerve	7	7.3	4.8	7.0
Hard Landing	4	4.2	3.4	4.9
Wheels-up Landing	8	8.3	3.4	4.9
Overshoot	2	2.1	2.8	4.1
Gear Retracted	2	2.1	2.8	4.1
Undershoot	2	2.1	2.6	3.8
Col. with Ground/Water-Uncontrolled	3	3.1	2.4	3.5
Airframe Failure in Flight	5	5.2	2.0	2.9
Fire or Explosion in Flight	1	1.0	1.6	2.3
Stall/Mush	5	5.2	1.4	2.0
Col. Between Aircraft-Both in Flight	2	2.1	1.2	1.7
Gear Collapsed	2	2.1	1.0	1.5
Roll Over	0	0.0	0.8	1.2
(All Other Types)	14	14.6	6.4	9.3
Total	96	100.0	68.8	100.0

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Table 134 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
CORPORATE/EXECUTIVE FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
Landing	44	45.8	33.8	49.1
In Flight	29	30.2	17.2	25.0
Takeoff	16	16.7	13.0	18.9
Taxi	1	1.0	3.6	5.2
Static	6	6.3	1.0	1.5
Not Reported	0	0.0	0.2	0.3
Total	96	100.0	68.8	100.0

Table 135 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
CORPORATE/EXECUTIVE FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	54	56.2	49.0	71.2
Weather	27	28.1	20.6	29.9
Powerplant	18	18.7	12.4	18.0
Personnel	18	18.7	9.8	14.2
Airport/Airways/Facilities	8	8.3	9.4	13.6
Terrain	13	13.5	7.8	11.3
Landing Gear	14	14.5	4.8	6.9
Undetermined	2	2.0	3.4	4.9
Miscellaneous	6	6.2	2.4	3.4
Systems	6	6.2	2.0	2.9
Airframe	4	4.1	1.4	2.0
Rotorcraft	1	1.0	1.2	1.7
Instruments/Equipment and Accessories	2	2.0	0.4	0.5
No. of Accidents with Cause(s) Assigned	96		68.8	

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AERIAL APPLICATION FLYING

Tables 136 through 146 present statistics concerning accidents involving aircraft being flown for aerial application purposes. The accident rate for this flying category is approximately 78 percent higher than the overall general aviation rate for 1980. The fatal accident rate for aerial application flying is more than 29 percent lower than for all of general aviation. In 1980, 84.8 percent of aerial application accidents resulted in no more than minor injuries as compared to 71.6 percent of all general aviation accidents.

The majority (63.7 percent) of accidents in this category occur during an in-flight phase of operation, while only 12.6 percent occur during landing. The corresponding percentages for all general aviation accidents are 34.2 percent (in-flight) and 41.9 percent (landing).

Table 136 - SUMMARY OF LOSSES
AERIAL APPLICATION FLYING
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	25	27	28
Involved Serious Injury	30	53	37
Involved Minor Injury	65	75	61
Involved No Injury	243	240	331
Total	363	395	457
Fatalities			
Passenger	3	0	0
Crew	25	25	27
Other Persons	4	2	1
Total	32	27	28
Aircraft Damaged*			
Destroyed	114	120	157
Substantial	249	273	299
Minor	0	2	1
None	1	0	2
Total	364	395	459

* Number of General Aviation Aircraft in Aerial Application Operations

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Table 137 - PERSONS BY ROLE AND DEGREE OF INJURY
AERIAL APPLICATION FLYING
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	24	30	63	247	364
Copilot	1	0	0	0	1
Passengers	3	0	1	3	7
Aboard Total	28	30	64	250	372
Other Aircraft*	3	0	1	1	5
Other Ground	1	0	0	0	1
Grand Total	32	30	65	251	378
Percent	8.5	7.9	17.2	66.4	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are a part of this tabulation.

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Table 138 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
AERIAL APPLICATION FLYING
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	1	0	1	17	19	5.2
Wheels-up Landing	0	0	0	1	1	0.3
Hard Landing	0	1	1	0	2	0.5
Nose Over/Down	0	0	3	7	10	2.7
Roll Over	0	0	0	1	1	0.3
Undershoot	0	0	0	3	3	0.8
Col. Between Aircraft-Both in Flight	1	0	0	0	1	0.3
Col. Between Aircraft-Both on Ground	0	0	1	0	1	0.3
Col. with Ground/Water-Controlled	2	0	2	11	15	4.1
Col. with Ground/Water-Uncontrolled	4	2	3	2	11	3.0
Col. with Wires/Poles	5	6	5	23	39	10.7
Col. with Trees	3	2	4	10	19	5.2
Col. with Fence, Fenceposts	0	1	0	3	4	1.1
Col. with Electronic Towers	1	1	1	0	3	0.8
Col. with Crop	0	0	2	8	10	2.7
Col. with Flagman Loader	1	0	0	0	1	0.3
Col. with Ditches	0	0	0	3	3	0.8
Col. with Dirt Bank	1	0	2	5	8	2.2
Col. with Other	0	1	1	4	6	1.6
Bird Strike	0	0	0	1	1	0.3
Stall	1	1	2	2	6	1.6
Stall/Spin	1	2	0	0	3	0.8
Stall/Mush	0	5	10	30	45	12.4
Fire or Explosion in Flight	0	0	0	1	1	0.3
Airframe Failure in Flight	2	1	1	2	6	1.6
Engine Failure or Malfunction	2	4	23	99	128	35.3
Propeller Failure	0	0	0	2	2	0.5
Tail Rotor Failure	0	3	0	3	6	1.6
Main Rotor Failure	0	0	2	5	7	1.9
Turbulence	0	0	1	0	1	0.3
No. of Accidents	25	30	65	243	363	
Percent	6.9	8.3	17.9	66.9		

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Table 139 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
AERIAL APPLICATION FLYING
1980

Phase of Operation	Degree of Damage			Aircraft	
	Des.	Sub.	None	No.	Percent
Taxi:					
From Landing	0	2	0	2	0.5
Aerial Taxi to Takeoff	0	1	0	1	0.3
Takeoff:					
Run	2	6	0	8	2.2
Initial Climb	23	48	0	71	19.5
Vertical	0	2	0	2	0.5
Aborted (Fixed-Wing)	0	2	0	2	0.5
Inflight:					
Climb to Cruise	1	1	0	2	0.5
Normal Cruise	2	9	0	11	3.0
Descending	1	0	0	1	0.3
Hovering	1	0	0	1	0.3
Uncontrolled Descent	1	0	0	1	0.3
Low Pass	2	1	0	3	0.8
En Route to Treat Crop	3	16	0	19	5.2
En Route to Reloading Area	1	3	0	4	1.1
Survey Field/Area	0	2	0	2	0.5
Starting Swath Run	3	10	1	14	3.8
Swath Run	24	33	0	57	15.7
Flareout for Swath Run	1	2	0	3	0.8
Pullup from Swath Run	9	14	0	23	6.3
Procedure Turnaround	26	40	0	66	18.1
Cleanup Swath	4	8	0	12	3.3
Maneuver to Avoid Obstruction	0	2	0	2	0.5
Return to Strip	3	8	0	11	3.0
Landing:					
Traffic Pattern-Circling	0	3	0	3	0.8
Final Approach (VFR)	3	5	0	8	2.2
Level Off/Touchdown	2	7	0	9	2.5
Roll (Fixed Wing)	2	21	0	23	6.3
Power-On Landing (Rotorcraft)	0	3	0	3	0.8
No. of Aircraft	114	249	1	364	
Percent	31.3	68.4	0.3		

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Table 140 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
AERIAL APPLICATION FLYING
1980

Condition of Light	Type of Weather		Accidents	
	VFR	IFR	No.	Percent
Dawn	7	1	8	2.2
Daylight	336	1	337	92.8
Dusk	5	0	5	1.4
Night (Dark)	10	1	11	3.0
Night (Moonlight-Bright)	2	0	2	0.5
No. of Accidents	360	3	363	
Percent	99.2	0.8		

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Table 141 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
AERIAL APPLICATION FLYING
1980

Proximity to Airport	Flight Plan			Aircraft	
	None	VFR	Unk/ NR	No.	Percent
On Airport	57	0	1	58	15.9
On Seaplane Base	1	0	0	1	0.3
On Heliport	1	0	0	1	0.3
In Traffic Pattern	14	0	0	14	3.8
Miles from Airport:					
Within 1/4	23	0	0	23	6.3
1/4+ to 1/2	11	0	0	11	3.0
1/2+ to 3/4	2	0	0	2	0.5
3/4+ to 1	6	0	0	6	1.6
1+ to 2	14	0	0	14	3.8
2+ to 3	7	0	0	7	1.9
3+ to 4	7	0	0	7	1.9
4+ to 5	4	0	0	4	1.1
Beyond 5	160	1	0	161	44.2
Unknown/Not Reported	55	0	0	55	15.1
No. of Aircraft	365	1	1	364	
Percent	99.4	0.3	0.3		

Table 142 - MOST PREVALENT DETAILED ACCIDENT CAUSES
AERIAL APPLICATION FLYING
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Failed to Obtain/Maintain Flying Speed	52	14.3
Pilot-Inadequate Preflight Prep. and/or Planning	44	12.1
Misc Acts, Conditions-Material Failure	41	11.3
Pilot-Misjudged Clearance	38	10.5
Powerplant-Failure for Undetemined Reasons	34	9.4
Pilot-Failed to See and Avoid Objects or Obstructions	30	8.3
Pilot-Mismanagement of Fuel	27	7.4
Misc Acts, Conditions-Fuel Exhaustion	26	7.2
Personnel-Inadequate Maintenance and Inspection	14	3.9
Misc-Evasive Maneuver to Avoid Collision	13	3.6

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Table 143 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
AERIAL APPLICATION FLYING
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	432	34	35	35
1976	434	40	44	42
1977	455	31	35	34
1978	457	28	28	27
1979	395	27	27	25
1980	363	25	32	28

Year	Hours Flown	Accident Rate per 100,000* Aircraft Hours Flown	
		Total	Fatal
1975	1,876,000	23.03	1.81
1976	2,136,000	20.27	1.87
1977	2,072,000	21.96	1.50
1978	2,082,000	21.95	1.34
1979	2,393,000	16.51	1.13
1980	2,063,000	17.60	1.21

* Suicide and sabotage accident excluded from rates as follows:
Total - 1976 (1)
Fatal - none

Table 144 - MOST PREVALENT TYPES OF ACCIDENTS
AERIAL APPLICATION FLYING
1980 AND 1975 - 1979

Type of Accident	1980		1975 - 1979	
	No.	Percent	Mean	Percent
Engine Failure or Malfunction	128	35.3	133.0	30.6
Col. with Object	93	25.6	125.6	28.9
Stall/Mush	45	12.4	42.8	9.8
Ground-Water Loop-Swerve	19	5.2	24.2	5.6
Col. with Ground/Water-Controlled	15	4.1	22.2	5.1
Stall	6	1.7	17.6	4.0
Nose Over/Down	10	2.8	11.0	2.5
Col. with Ground/Water-Uncontrolled	11	3.0	7.6	1.7
Stall/Spin	3	0.8	6.0	1.4
Airframe Failure in Flight	6	1.7	5.0	1.2
(All Other Types)	27	7.4	39.6	9.1
Total	363	100.0	434.6	100.0

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Table 145 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
AERIAL APPLICATION FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
In Flight	232	63.7	288.8	66.1
Takeoff	83	22.8	94.2	21.5
Landing	46	12.6	48.6	11.1
Taxi	3	0.8	4.0	0.9
Static	0	0.0	1.6	0.4
Total	364	100.0	437.2	100.0

Table 146 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
AERIAL APPLICATION FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	232	63.9	314.4	72.3
Terrain	110	30.3	161.6	37.1
Powerplant	91	25.0	99.6	22.9
Weather	38	10.4	44.2	10.1
Personnel	38	10.4	39.0	8.9
Miscellaneous	18	4.9	21.4	4.9
Airport/Airways/Facilities	16	4.4	18.8	4.3
Landing Gear	8	2.2	14.0	3.2
Rotorcraft	18	4.9	10.6	2.4
Instruments/Equipment and Accessories	2	0.5	6.2	1.4
Undetermined	2	0.5	6.0	1.3
Airframe	4	1.1	2.6	0.5
Systems	8	2.2	2.4	0.5
No. of Accidents with Cause(s) Assigned	363		434.6	

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INSTRUCTIONAL FLYING

Tables 147 through 158 present data describing instructional flying accidents. The total of 461 accidents in 1980 is well below the average (564.2) for the previous five years. Both the total and fatal accident rates for this category were substantially lower than the rates for all general aviation operations. Eleven of the 23 mid-air collision accidents in general aviation involved at least one aircraft being flown for instructional purposes. Nearly 60 percent of all instructional flying accidents in 1980 occurred during the landing phase of operation.

Table 147 - SUMMARY OF LOSSES
INSTRUCTIONAL FLYING
1978 - 1980

	1980	1979	1978
Accidents			
Fatal	41	40	62
Involved Serious Injury	38	41	34
Involved Minor Injury	54	63	91
Involved No Injury	328	373	417
Total	461	517	604
Fatalities			
Passenger	12	4	8
Crew	58	48	84
Other Persons	3	8	151
Total	73	60	243
Aircraft Damaged*			
Destroyed	78	84	94
Substantial	382	430	508
Minor	1	4	5
None	5	3	3
Total	466	521	610

* Number of General Aviation Aircraft in Instructional Operations

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Table 148 - PERSONS BY ROLE AND DEGREE OF INJURY
INSTRUCTIONAL FLYING
1980

Role of Person	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Pilot	39	33	51	343	466
Copilot	1	1	1	5	8
Dual Student	15	16	17	133	181
Check Pilot	3	1	0	9	13
Extra Crew	0	0	1	1	2
Passengers	12	6	5	20	43
Total Aboard	70	57	75	511	713
Other Aircraft*	3	1	1	19	24
Other Ground	0	3	0	2	5
Grand Total	73	61	76	532	742
Percent	9.8	8.2	10.2	71.7	

* Injuries carried opposite Other Aircraft are injuries occurring in aircraft that are not part of this tabulation, but which were involved in collisions with aircraft which are included in this tabulation.

Table 149 - PERSONS ABOARD BY KIND OF FLYING AND INJURY
INSTRUCTIONAL FLYING
1980

Kind of Flying	Degree of Injury				
	Fatal	Serious	Minor	None	Total
Dual	40	37	36	285	398
Solo (Supervised)	10	6	23	116	155
Check	7	2	0	22	31
Training	13	12	16	88	129
Total	70	57	75	511	713
Percent	9.8	8.0	10.5	71.7	

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Table 150 - ACCIDENTS BY TYPE AND DEGREE OF INJURY
INSTRUCTIONAL FLYING
1980

Type of Accident	Degree of Injury				Accidents	
	Fatal	Serious	Minor	None	No.	Percent
Ground-Water Loop-Swerve	0	0	11	85	96	20.8
Wheels-up Landing	0	0	0	4	4	0.9
Gear Collapsed	0	0	0	2	2	0.4
Gear Retracted	0	0	0	6	6	1.3
Hard Landing	0	3	11	81	95	20.6
Nose Over/Down	0	2	3	9	14	3.0
Roll Over	0	0	1	5	6	1.3
Overshoot	0	2	2	10	14	3.0
Undershoot	0	4	1	14	19	4.1
Col. Between Aircraft-Both in Flight	7	3	0	1	11	2.4
Col. Between Aircraft-Both on Ground	0	0	0	1	1	0.2
Col. with Ground/Water-Controlled	5	3	2	8	18	3.9
Col. with Ground/Water-Uncontrolled	3	1	0	1	5	1.1
Col. with Wires/Poles	2	0	1	2	5	1.1
Col. with Trees	2	2	1	5	10	2.2
Col. with Building/s	0	0	0	1	1	0.2
Col. with Fence, Fenceposts	0	0	0	3	3	0.6
Col. with Runway or Approach Lights	0	0	0	1	1	0.2
Col. with Crop	0	0	0	1	1	0.2
Col. with Ditches	0	1	0	3	4	0.9
Col. with Snowbank	0	0	0	1	1	0.2
Col. with Parked Aircraft (Unattended)	0	0	1	1	2	0.4
Col. with Dirt Bank	0	0	0	5	5	1.1
Col. with Other	0	1	0	3	4	0.9
Stall	3	3	1	3	10	2.2
Stall/Spin	7	0	0	0	7	1.5
Stall/Mush	1	4	2	5	12	2.6
Fire or Explosion	0	0	1	0	1	0.2
Fire or Explosion in Flight	0	0	0	1	1	0.2
Engine Failure or Malfunction	6	6	16	62	90	19.5
Propeller Failure	0	0	0	1	1	0.2
Main Rotor Failure	1	0	0	0	1	0.2
Prop/Rotor Accident to Person	0	2	0	0	2	0.2
Turbulence	0	0	0	3	3	0.6
Missing Aircraft Not Recovered	2	0	0	0	2	0.4
Miscellaneous/Other	1	1	0	0	2	0.4
Undetermined	1	0	0	0	1	0.2
No. of Accidents	41	38	54	328	461	
Percent	8.9	8.2	11.7	71.2		

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Table 151 - AIRCRAFT BY PHASE OF OPERATION AND AIRCRAFT DAMAGE
INSTRUCTIONAL FLYING
1980

Phase of Operation	Degree of Damage				Aircraft	
	Des.	Sub.	Minor	None	No.	Percent
Static:						
Idling Engine/s	0	0	0	2	2	0.4
Engine Runup	0	1	0	0	1	0.2
Taxi:						
To Takeoff	0	4	0	0	4	0.9
From Landing	0	6	0	0	6	1.3
Other	0	1	0	0	1	0.2
Aerial Taxi to/from Landing	0	1	0	0	1	0.2
Aerial Taxi, Other	0	0	0	1	1	0.2
Takeoff:						
Run	2	28	0	0	30	6.4
Initial Climb	12	28	0	0	40	8.6
Vertical	0	2	0	0	2	0.4
Running (Rotorcraft/VTOL-STOL)	0	1	0	0	1	0.2
Aborted (Fixed-Wing)	0	4	0	0	4	0.9
Aborted (Rotorcraft/VTOL)	0	1	0	0	1	0.2
Other	0	1	0	0	1	0.2
Inflight:						
Climb to Cruise	2	3	0	0	5	1.1
Normal Cruise	15	32	0	0	47	10.1
Descending	2	5	0	1	8	1.7
Hovering	1	2	0	0	3	0.6
Autorotative Descent	0	2	0	0	2	0.4
Acrobatics	2	1	0	0	3	0.6
Buzzing	1	0	0	0	1	0.2
Uncontrolled Descent	1	1	0	0	2	0.4
Low Pass	1	2	0	0	3	0.6
Other	7	8	0	0	15	3.2
Landing:						
Traffic Pattern-Circling	6	15	1	0	22	4.7
Final Approach (VFR)	7	24	0	0	31	6.6
Level Off/Touchdown	6	110	0	1	117	25.1
Roll (Fixed Wing)	4	68	0	0	72	15.4
Roll-On/Run-On (Rotorcraft)	0	2	0	0	2	0.4
Power-On Landing (Rotorcraft)	0	4	0	0	4	0.9
Power-Off Autorotative Ldg	0	6	0	0	6	1.3
Go-Around (VFR)	6	18	0	0	24	5.1
Other	0	1	0	0	1	0.2
Unknown/Not Reported	3	0	0	0	3	0.6
No. of Aircraft	78	382	1	5	466	
Percent	16.7	82.0	0.2	1.1		

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Table 152 - ACCIDENTS BY CONDITION OF LIGHT AND TYPE OF WEATHER
INSTRUCTIONAL FLYING
1980

Condition of Light	Type of Weather				Accidents	
	VFR	IFR	Below Minimums	Unk/ NR	No.	Percent
Dawn	2	0	0	0	2	0.4
Daylight	427	5	0	1	433	93.9
Dusk	6	0	0	0	6	1.3
Night (Dark)	12	4	1	0	17	3.7
Night (Moonlight-Bright)	2	0	0	0	2	0.4
Unknown/Not Reported	0	0	0	1	1	0.2
No. of Accidents	449	9	1	2	461	
Percent	97.4	2.0	0.2	0.4		

Table 153 - AIRCRAFT BY PROXIMITY TO AIRPORT AND FLIGHT PLAN
INSTRUCTIONAL FLYING
1980

Proximity to Airport	Flight Plan					Aircraft	
	None	VFR	IFR	Unk/NR	Other	No.	Percent
On Airport	255	33	2	3	0	293	62.9
In Traffic Pattern	10	5	0	0	1	16	3.4
Miles from Airport:							
Within 1/4	25	3	1	0	1	30	6.4
1/4+ to 1/2	12	0	1	0	0	13	2.8
1/2+ to 3/4	3	0	0	0	0	3	0.6
3/4+ to 1	5	2	0	0	0	7	1.5
1+ to 2	6	3	0	0	0	9	1.9
2+ to 3	6	2	0	0	0	8	1.7
3+ to 4	1	0	0	0	0	1	0.2
4+ to 5	0	1	0	0	0	1	0.2
Beyond 5	52	16	0	1	1	70	15.0
Unknown/Not Reported	14	0	0	1	0	15	3.2
No. of Aircraft	389	65	4	5	3	466	
Percent	83.5	13.9	0.9	1.1	0.6		

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Table 154 - MOST PREVALENT DETAILED ACCIDENT CAUSES
INSTRUCTIONAL FLYING
1980

Detailed Cause	Number of Accidents	Percent of Accidents
Pilot-Inadequate Supervision of Flight	82	17.8
Pilot-Improper Level Off	61	13.2
Pilot-Improper Recovery from Bounced Landing	36	7.8
Pilot-Failed to Maintain Directional Control	35	7.6
Pilot-Improper Op'n of Brakes and/or Flight Controls	31	6.7
Pilot-Inadequate Preflight Prep. and/or Planning	28	6.1
Powerplant-Misc-Failure for Undetermined Reasons	26	5.6
Pilot-Failed to Obtain/Maintain Flying Speed	24	5.2
Pilot-Mismanagement of Fuel	24	5.2
Misc Acts, Conditions-Fuel Exhaustion	24	5.2

Table 155 - ACCIDENTS, FATAL ACCIDENTS, FATALITIES, AND RATES
INSTRUCTIONAL FLYING
1975 - 1980

Year	Accidents	Fatal Accidents	Fatalities	
			Total	Aboard Aircraft in this Category
1975	587	43	77	60
1976	541	55	97	87
1977	572	48	68	64
1978	604	62	243	92
1979	517	40	60	52
1980	461	41	73	70

Year	Hours Flown	Accident Rate per 100,000 Aircraft Hours Flown	
		Total	Fatal
1975	5,882,000	9.98	0.73
1976	6,102,000	8.87	0.90
1977	7,646,000	7.48	0.63
1978	6,322,000	9.55	0.98
1979	8,144,000	6.35	0.49
1980	7,315,000	6.30	0.56

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Table 156 - MOST PREVALENT TYPES OF ACCIDENTS
INSTRUCTIONAL FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Type of Accident	No.	Percent	Mean	Percent
Engine Failure or Malfunction	90	19.5	121.4	21.5
Ground-Water Loop-Swerve	96	20.8	104.4	18.5
Hard Landing	95	20.6	88.4	15.7
Col. with Object	37	8.0	57.2	10.1
Undershoot	19	4.1	22.6	4.0
Nose Over/Down	14	3.0	21.6	3.8
Overshoot	14	3.0	21.4	3.8
Stall/Mush	12	2.6	17.8	3.2
Col. with Ground/Water-Controlled	18	3.9	15.4	2.7
Stall	10	2.2	13.6	2.4
Stall/Spin	7	1.5	13.0	2.3
Col. Between Aircraft-Both in Flight	11	2.4	11.8	2.1
Col. with Ground/Water-Uncontrolled	5	1.1	6.8	1.2
Gear Collapsed	2	0.4	5.8	1.0
Wheels-up Landing	4	0.9	5.8	1.0
(All Other Types)	27	5.9	37.2	6.6
Total	461	100.0	564.2	100.0

Table 157 - PHASE OF OPERATION FOR ACCIDENT-INVOLVED AIRCRAFT
INSTRUCTIONAL FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Phase of Operation	No.	Percent	Mean	Percent
Landing	279	59.9	335.0	58.8
In Flight	89	19.1	113.8	20.0
Takeoff	79	17.0	95.8	16.8
Taxi	13	2.8	18.6	3.3
Static	3	0.6	5.2	0.9
Not Reported	3	0.6	1.0	0.2
Total	466	100.0	569.4	100.0

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Table 158 - BROAD CAUSE/FACTOR ASSIGNMENTS - ALL ACCIDENTS
INSTRUCTIONAL FLYING
1980 AND 1975 - 1979

	1980		1975 - 1979	
Broad Cause/Factor	No.	Percent	Mean	Percent
Pilot	401	86.9	488.0	86.4
Terrain	80	17.3	108.4	19.2
Weather	73	15.8	84.2	14.9
Personnel	41	8.8	70.2	12.4
Powerplant	54	11.7	61.8	10.9
Airport/Airways/Facilities	27	5.8	55.8	9.8
Landing Gear	8	1.7	15.6	2.7
Miscellaneous	10	2.1	14.2	2.5
Systems	6	1.3	7.4	1.3
Undetermined	5	1.0	4.8	0.8
Rotorcraft	2	0.4	3.4	0.6
Airframe	1	0.2	3.2	0.5
Instruments/Equipment and Accessories	2	0.4	1.4	0.2
No. of Accidents with Cause(s) Assigned	461		564.2	

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BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ G.H. PATRICK BURSLEY
Member

/s/ DONALD D. ENGEN
Member

/s/ VERNON L. GROSE
Member

Patricia A. Goldman, Vice Chairman, and Donald D. Engen, Member, submitted a concurring and dissenting statement:

> We support all the facts and conclusions in this Review except those drawn from the combination of "business" and "personal" flying accident statistics (see page 94). Further, we do not support the rationale, as expressed in Appendix C, for calculating an accident rate for the combined categories of "business" and "personal" flying. While recognizing that the exposure data may not be entirely accurate as it is now reported, the rationale set forth does not convince us that there will be a higher degree of reliability in the combined figure. We believe there remains a need to give identity to both the business and personal accident statistics.

April 12, 1984

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APPENDIX A -- EXPLANATORY NOTES

AIRCRAFT ACCIDENT: The accidents included in this report are the occurrences incident to flight in which, "as a result of the operation of an aircraft, any person (occupant or nonoccupant) receives fatal or serious injury or any aircraft receives substantial damage." The definition of substantial damage in 49 CFR 830 is:

(1) Except as provided in subparagraph (2) of this paragraph, substantial damage means damage or structural failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component.

(2) Engine failure, damage limited to an engine, bent fairings or cowling, dented skin, small punctured holes in the skin of fabric, ground damage to rotor or propeller blades, damage to landing gear, wheels, tires, flaps engine accessories, brakes, or wingtips are not considered "substantial damage".

CAUSES AND RELATED FACTORS: In determining probable causes(s) of an accident, all facts, conditions, and circumstances are considered. The objective is to ascertain those cause and effect relationships in the accident sequence about which something can be done to prevent recurrence of the type of accident under consideration. Accordingly, for statistical purposes, where two or more causes exist in an accident, each is recorded and no attempt is made to establish a primary cause. Therefore, in the cause and related factor table, the figures shown in the columns dealing with cause will exceed the total number of accidents. The term "factor" is used, in general, to denote those elements of an accident that further explain or supplement the probable cause(s); this provides a means for collecting essential items of information that could not be readily categorized elsewhere in the system.

COLLISION BETWEEN AIRCRAFT: Collisions between aircraft are so classified only when both aircraft are occupied. This includes collisions wherein both aircraft are airborne (midair); one is airborne, the other on the ground; and both are on the ground. A collision with a parked unoccupied aircraft is classified under the broad category of collision with objects.

FATAL INJURY: Any injury which results in death within 7 days of the accident. On and after September 11, 1980: death which results within 30 days of an accident.

INJURY INDEX: Injury index refers to the highest degree of personal injury sustained as a result of the accident.

KIND OF FLYING: The purpose for which the aircraft was being operated at the time of the accident. In this report, accident statistics are presented for five kinds of flying which are defined as follows:

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Personal - Flying by individuals in their own or rented aircraft for pleasure, or personal transportation not in furtherance of their occupation or company business. This category includes, for the first time, practice flying (for the purpose of increasing or maintaining proficiency) not performed under supervision of an accredited instructor, and not part of an approved flight training program.

Business - The use of aircraft by pilots (not receiving direct salary or compensation for piloting) in connection with their occupation or in the furtherance of a private business.

Corporate/Executive - The use of aircraft owned or leased, and operated by a corporate or business firm for the transportation of personnel or cargo in furtherance of the corporation's or firm's business, and which are flown by professional pilots receiving a direct salary or compensation for piloting.

Aerial Application - The operation of aircraft for the purpose of dispensing any substance for plant nourishment, soil treatment, propagation of plant life, pest control, or fire control, including flying to and from the application site.

Instructional - Flying accomplished in supervised training under the direction of an accredited instructor.

PHASE OF OPERATION: The phase of the flight or operation is the particular phase of flight in which the first accident type or circumstance occurred. In the event that both the first and second type of accident occur in one operational phase, the same phase is recorded twice.

SERIOUS INJURY: Any injury which 1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; 2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); 3) involves lacerations which cause severe hemorrhages, nerve, muscle, or tendon damage; 4) involves injury to any internal organ; or 5) involves second- or third-degree burns, or any burns affecting more than 5 percent of body surface.

TYPE OF ACCIDENT: The type of accident relates to the circumstances involved in the accident; it indicates what happended. Two separate types may be recorded for one accident. The selection of first and second type is made according to the sequence in which the circumstances occurred.

TYPES OF WEATHER CONDITIONS: The types of weather conditions (VFR/IFR) are determined in accordance with the prescribed minima in Part 91 of the Federal Aviation Regulations. These minima pertain to the ceiling and visibility, in conjunction with the type of airspace, at the accident site. Type of weather conditions is based on surface weather as determined from officially recognized sources. Weather conditions encountered in flight are not necessarily representative of the classifications VFR/IFR as carried under Type of Weather Conditions.

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Appendix B -- CAUSE/FACTOR TABLE
ALL OPERATIONS
1980

(EXCLUDES ACCIDENTS WITHOUT CAUSAL ASSIGNMENT)

INVOLVES 3597 TOTAL ACCIDENTS
INVOLVES 622 FATAL ACCIDENTS

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
** PILOT **						
PILOT IN COMMAND						
ATTEMPTED OPERATION W/KNOWN DEFICIENCIES IN EQUIPMENT	11	4	15	21	13	34
ATTEMPTED OPERATION BEYOND EXPERIENCE/ABILITY LEVEL	21	6	27	31	9	40
BECAME LOST/DISORIENTED	9	2	11	29	17	46
CONTINUED VFR FLIGHT INTO ADVERSE WEATHER CONDITIONS	98	4	102	129	11	140
CONTINUED INTO KNOWN AREA OF SEVERE TURBULENCE	5		5	7		7
DELAYED ACTION IN ABORTING TAKEOFF				39		39
DELAYED IN INITIATING GO-AROUND	4	1	5	79	4	83
DIVERTED ATTENTION FROM OPERATION OF AIRCRAFT	5	3	8	41	10	51
EXCEEDED DESIGN STRESS LIMITS OF AIRCRAFT	22		22	25		25
FAILED TO EXTEND LANDING GEAR				30		30
FAILED TO RETRACT LANDING GEAR	1		1	3		3
RETRACTED GEAR PREMATURELY	1		1	4		4
INADVERTENTLY RETRACTED GEAR				6		6
FAILED TO SEE AND AVOID OTHER AIRCRAFT	27		27	43		43
FAILED TO SEE AND AVOID OBJECTS OR OBSTRUCTIONS	30		30	110		110
FAILED TO OBTAIN/MAINTAIN FLYING SPEED	125		125	347		347
MISJUDGED, SPEED, ALTITUDE OR CLEARANCE	9		9	16		16
FAILED TO MAINTAIN ADEQUATE ROTOR RPM	4		4	19		19
FAILED TO USE OR INCORRECTLY USED MISC EQUIPMENT	1		1	5	1	6
FAILED TO FOLLOW APPROVED PROCEDURES, DIRECTIVES ETC	13	8	21	60	17	77
IMPROPER OPERATION OF POWERPLANT & POWERPLANT CONTROLS	5	4	9	60	8	68
IMPROPER OPERATION OF BRAKES AND/OR FLIGHT CONTROLS	2		2	121	1	122
IMPROPER OPERATION OF FLIGHT CONTROLS	10		10	46	2	48
PREMATURE LIFT OFF				31	2	33
IMPROPER LEVEL OFF	1		1	189		189
IMPROPER IFR OPERATION	23		23	32		32
IMPROPER IN-FLIGHT DECISIONS OR PLANNING	21	4	25	122	12	134
IMPROPER COMPENSATION FOR WIND CONDITIONS	3		3	122	3	125
INADEQUATE PREFLIGHT PREPARATION AND/OR PLANNING	62	9	71	409	46	455
INADEQUATE SUPERVISION OF FLIGHT	7		7	93		93
LACK OF FAMILIARITY WITH AIRCRAFT	3	15	18	15	71	86
MISMANAGEMENT OF FUEL	24		24	255	1	256
EXERCISED POOR JUDGMENT	37	16	53	74	33	107
OPERATED CARELESSLY				1	1	2
SELECTED UNSUITABLE TERRAIN	4		4	168	3	171

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

PILOT (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
IMPROPER STARTING PROCEDURES				2		2
STARTED ENGINE WITHOUT PROPER ASSISTANCE/EQUIPMENT				9		9
TAXIED/PARKED WITHOUT PROPER ASSISTANCE				6	1	7
FAILED TO ASSURE THE GEAR WAS DOWN AND LOCKED				22	1	23
INITIATED FLIGHT IN ADVERSE WEATHER CONDITIONS	32	3	35	42	5	47
CONTROL INTERFERENCE	1		1	1		1
SPONTANEOUS-IMPROPER ACTION				3	1	4
MISJUDGED DISTANCE, SPEED, AND ALTITUDE	6		6	39		39
MISJUDGED DISTANCE AND SPEED	7		7	161	2	163
MISJUDGED DISTANCE	1		1	2		2
MISJUDGED DISTANCE AND ALTITUDE	5		5	83		83
MISJUDGED SPEED AND ALTITUDE				6		6
MISJUDGED SPEED	1		1	7	1	8
MISJUDGED SPEED AND CLEARANCE	1		1	6		6
MISJUDGED ALTITUDE AND CLEARANCE	18		18	43	1	44
MISJUDGED ALTITUDE	30		30	45	1	46
MISJUDGED CLEARANCE	14		14	100	1	101
MISUNDERSTANDING OF ORDERS OR INSTRUCTIONS				2	1	3
IMPROPER RECOVERY FROM BOUNCED LANDING	2	1	3	109	3	112
INCAPACITATION	11		11	13		13
PHYSICAL IMPAIRMENT	19	11	30	28	15	43
SPATIAL DISORIENTATION	74	1	75	77	1	78
PSYCHOLOGICAL CONDITION	1		1	1		1
MISUSED OR FAILED TO USE FLAPS	2	4	6	13	24	37
LEFT AIRCRAFT UNATTENDED ENGINE RUNNING	1		1	1	1	2
FAILED TO MAINTAIN DIRECTIONAL CONTROL		1	1	134	2	136
SELECTED WRONG RUNWAY RELATIVE TO EXISTING WIND	1	5	6	51	19	70
FAILED TO ABORT TAKEOFF	8	1	9	55	3	58
FAILED TO INITIATE GO-AROUND	2		2	81	1	82
DIRECT ENTRIES	2		2	2		2
SUBTOTAL	827	103	930	3926	349	4275
COPILOT						
FAILED TO EXTEND LANDING GEAR				1		1
INADVERTENTLY RETRACTED GEAR				2		2
FAILED TO SEE AND AVOID OBJECTS OR OBSTRUCTIONS	1		1	1		1
FAILED TO OBTAIN/MAINTAIN FLYING SPEED	2		2	2		2
FAILED TO FOLLOW APPROVED PROCEDURES, DIRECTIVES, ETC					2	2
IMPROPER OPERATION OF BRAKES AND/OR FLIGHT CONTROLS				1		1
IMPROPER OPERATION OF FLIGHT CONTROLS	1		1	1		1
IMPROPER LEVEL OFF				1		1
LACK OF FAMILIARITY WITH AIRCRAFT					2	2
MISJUDGED DISTANCE AND SPEED				1		1

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

PILOT (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
MISJUDGED DISTANCE AND ALTITUDE		1	1		1	1
MISJUDGED CLEARANCE				1		1
INCAPACITATION	1		1	1		1
PHYSICAL IMPAIRMENT		1	1		1	1
MISUSED OR FAILED TO USE FLAPS	1		1	1	1	2
FAILED TO MAINTAIN DIRECTIONAL CONTROL				1		1
SUBTOTAL	6	2	8	14	7	21
DUAL STUDENT						
DELAYED IN INITIATING GO-AROUND				1		1
FAILED TO EXTEND LANDING GEAR				1		1
INADVERTENTLY RETRACTED GEAR				2		2
FAILED TO SEE OTHER AIRCRAFT				2		2
FAILED TO OBTAIN/MAINTAIN FLYING SPEED	1		1	7		7
FAILED TO MAINTAIN ADEQUATE ROTOR RPM				2		2
IMPROPER OPERATION OF POWERPLANT + POWERPLANT CONTROLS				4		4
IMPROPER OPERATION OF BRAKES AND/OR FLIGHT CONTROLS				4		4
IMPROPER OPERATION OF FLIGHT CONTROLS				10		10
PREMATURE LIFT-OFF				1		1
IMPROPER LEVEL OFF				16		16
IMPROPER COMPENSATION FOR WIND CONDITIONS				3		3
INADEQUATE PREFLIGHT PREPARATION AND/OR PLANNING				1		1
LACK OF FAMILIARITY WITH AIRCRAFT					1	1
MISMANAGEMENT OF FUEL				2		2
EXERCISED POOR JUDGEMENT				1		1
OPERATED CARELESSLY				1		1
FAILED TO ASSURE THE GEAR WAS DOWN AND LOCKED				1		1
FAILURE TO RELINQUISH CONTROL				4		4
CONTROL INTERFERENCE				3		3
SPONTANEOUS-IMPROPER ACTION				3		3
MISJUDGED DISTANCE, SPEED, AND ALTITUDE				2		2
MISJUDGED DISTANCE AND SPEED				5		5
MISJUDGED DISTANCE AND ALTITUDE				12	1	13
MISJUDGED SPEED AND ALTITUDE				1		1
MISJUDGED ALTITUDE AND CLEARANCE	1		1	2		2
MISJUDGED ALTITUDE				1		1
IMPROPER RECOVERY FROM BOUNCED LANDING				1		1
PHYSICAL IMPAIRMENT					1	1
SPATIAL DISORIENTATION	1		1	1		1
FAILED TO MAINTAIN DIRECTIONAL CONTROL				10		10
FAILED TO INITIATE GO-AROUND				1		1
SUBTOTAL	3		3	105	3	108

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
CHECK PILOT						
INADEQUATE SUPERVISION OF FLIGHT	2		2	6	1	7
SUBTOTAL	2		2	6	1	7
** PERSONNEL **						
RULES, REGULATIONS, STANDARDS PERSONNEL		2	2	1	2	3
FLIGHT INSTRUCTOR						
INADEQUATE SUPERVISION OF FLIGHT	1	2	3	3	4	7
INADEQUATE TRAINING OF STUDENT				1		1
MAINTENANCE, SERVICING, INSPECTION						
IMPROPER MAINTENANCE(MAINTENANCE PERSONNEL)				15	3	18
IMPROPER MAINTENANCE(OWNER PERSONNEL)	2		2	14	1	15
IMPROPERLY SERVICED AIRCRAFT(GROUND CREW)	1		1	5	1	6
IMPROPERLY SERVICED AIRCRAFT(OWNER-PILOT)				8		8
INADEQUATE INSPECTION OF AIRCRAFT(MAINTENANCE PERSONNEL	2		2	10		10
INADEQUATE INSPECTION OF ACFT(OWNER-PILOT PERSONNEL)	2		2	6	1	7
INADEQUATE MAINTENANCE AND INSPECTION	11	6	17	111	18	129
OTHER	1		1	10	3	13
OPERATIONAL SUPERVISORY PERSONNEL						
INADEQUATE SUPERVISION OF FLIGHT CREW		1	1		1	1
FAILURE TO PROVIDE ADEQ DIRECTIVES, MANUALS, EQUIPMENT		1	1		2	2
DEFICIENCY, COMPANY MAINTAINED EQMT, SERV, REGULATIONS	1	1	2	3	2	5
WEATHER PERSONNEL						
INCORRECT WEATHER FORECAST		1	1		1	1
INADEQUATE/INCORRECT WEATHER BRIEFING		3	3		3	3
TRAFFIC CONTROL PERSONNEL						
FAILURE OR DELAY IN INITIATING EMERGENCY PROCEDURES		1	1		1	1
FAILURE TO ADVISE OF UNSAFE WEATHER CONDITION		1	1		2	2
FAILURE TO ADVISE OF UNSAFE AIRPORT CONDITION		1	1		1	1
FAILURE TO ADVISE OF OTHER TRAFFIC					1	1
FAILURE TO PROPERLY IDENTIFY AIRCRAFT ON RADAR	1		1	1	1	2
OTHER		6	6		7	7
AIRPORT SUPERVISORY PERSONNEL						
IMPROPER MAINTENANCE-AIRPORT FACILITIES					2	2
FAILURE TO NOTIFY OF UNSAFE COND/AND OR FAILURE TO MARK				4		4
OTHER				1	1	2
AIRWAYS FACILITIES PERSONNEL						
INADEQUATELY MAINTAINED APPROACH FACILITIES		1	1		1	1
OTHER		1	1		1	1
PRODUCTION-DESIGN-PERSONNEL						
SUBSTANDARD QUALITY CONTROL	3		3	5		5
INCORRECT FACTORY INSTALLATION				1		1
POOR/INADEQUATE DESIGN	2	1	3	11	1	12

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

PERSONNEL (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FACTOR	TOTAL	ALL ACCIDENTS CAUSE	FACTOR	TOTAL
OTHER	1		1	9		9
MISCELLANEOUS-PERSONNEL						
PILOT OF OTHER AIRCRAFT	28		28	54	1	55
GROUND SIGNALMAN	1		1	2		2
SPECTATOR	1		1	2		2
GROUND CREWMAN	1	2	3	3	3	6
PASSENGER	3		3	18	4	22
DRIVER OF VEHICLE				6		6
OTHER				5	2	7
THIRD PILOT						
FLIGHT ENGINEER						
IMPROPER USE OF EQUIPMENT	1		1	1		1
FLIGHT PERSONNEL						
DISPATCHING (AIR CARRIER ONLY)						
SUBTOTAL	63	31	94	310	71	381
** AIRFRAME **						
WINGS						
SPARS	2	15	17	4	16	20
WING ATTACHMENT FITTINGS, BOLTS		1	1	2	1	3
BRACING WIRES, STRUTS	2		2	3		3
SKIN AND ATTACHMENTS		2	2	2	2	4
OTHER		1	1		1	1
FUSELAGE						
LONGERONS				1		1
DOORS, DOOR FRAMES				2		2
WINDSHIELDS, WINDOWS, CANOPIES					1	1
SEATS	1	1	2	4	4	8
WHEEL WELL DOORS				1		1
OTHER	1		1	3		3
LANDING GEAR						
MAIN GEAR-SHOCK ABSORBING ASSY, STRUTS, ATTACHMENTS, ETC				17		17
NORMAL RETRACTION/EXTENSION ASSEMBLY				18	2	20
EMERGENCY/EXTENSION ASSEMBLY				1		1
TAILWHEEL ASSEMBLIES				3	1	4
NOSEWHEEL ASSEMBLIES				7	1	8
WHEELS, TIRES, AXLES				10	1	11
SKI ASSEMBLIES				3		3
FLOAT ASSEMBLIES				1		1
BRAKING SYSTEM (NORMAL)				36	6	42
BRAKING SYSTEM (EMERGENCY)				1		1
LANDING GEAR WARNING AND INDICATING COMPONENTS					5	5

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FATAL ACCIDENTS FACTOR	FATAL ACCIDENTS TOTAL	ALL ACCIDENTS CAUSE	ALL ACCIDENTS FACTOR	ALL ACCIDENTS TOTAL
AIRFRAME (CONTINUED)						
GEAR LOCKING MECHANISM				9		9
SWITCHES, LEVERS, CRANKING MECHANISM, ETC				5	2	7
NOSEWHEEL STEERING				5		5
OTHER					1	1
FLIGHT CONTROL SURFACES						
ELEVATOR, ASSEMBLY ATTACHMENTS	1		1	5		5
RUDDER, SURFACES ATTACHMENTS		1	1	1	1	2
AILERON, SURFACES ATTACHMENTS				2		2
HORIZONTAL STABILIZER, ATTACHMENTS		5	5		6	6
FLAP ASSEMBLIES				2	1	3
OTHER		1	1		1	1
SUBTOTAL	7	27	34	148	53	201
** POWERPLANT **						
ENGINE STRUCTURE						
CRANKCASE				3		3
CRANKSHAFT	2		2	12		12
MASTER AND CONNECTING RODS	2		2	16		16
CYLINDER ASSEMBLY	3	2	5	17	5	22
PISTON, PISTON RINGS	1	3	4	11	5	16
VALVE ASSEMBLIES	4	3	7	20	3	23
BLOWER, IMPELLER ASSEMBLY				6		6
MOUNT AND VIBRATION ISOLATORS				2		2
OTHER	1		1	5		5
IGNITION SYSTEM						
MAGNETOES	1		1	15	2	17
DISTRIBUTOR				3	1	4
SPARK PLUG	2	3	5	12	6	18
IGNITION HARNESS, SHIELDING		1	1	2	1	3
LEADS				1		1
FUEL SYSTEM						
TANKS					1	1
LINES AND FITTINGS				23		23
SELECTOR VALVES	2	1	3	4	2	6
FILTERS, STRAINERS, SCREENS				6	2	8
PRIMING SYSTEM				1		1
CARBURETOR	1	1	2	21	2	23
PUMPS		1	1	13	2	15
FUEL INJECTION SYSTEM	1		1	7		7
VENTS, DRAINS, TANK CAPS		1	1	10	5	15
RAM AIR ASSEMBLY				3		3
OTHER	2	1	3	10	4	14

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

POWERPLANT (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FATAL ACCIDENTS FACTOR	FATAL ACCIDENTS TOTAL	ALL ACCIDENTS CAUSE	ALL ACCIDENTS FACTOR	ALL ACCIDENTS TOTAL
LUBRICATING SYSTEM						
TANKS				1		1
LINES, HOSES, FITTINGS				8		8
VALVES				1		1
FILTERS, SCREENS				2		2
PUMP-PRESSURE				7	1	8
OIL COOLERS				2		2
SEALS AND GASKETS		1	1	3	2	5
OTHER	1		1	5		5
COOLING SYSTEM						
COWLING				1		1
PROPELLER AND ACCESSORIES						
BLADES	1		1	9	1	10
HUBS				1		1
HYDRAULIC PITCH CONTROL MECHANISM				2		2
GOVERNORS				3		3
BLADE RETENTION MECHANISM				1		1
OTHER				3	1	4
EXHAUST SYSTEM						
MANIFOLDS				3		3
MUFFLERS	1	1	2	2	2	4
EXTERNAL SUPERCHARGER				6		6
OTHER				2		2
ENGINE ACCESSORIES						
VACUUM PUMPS		1	1		1	1
ELECTRIC PUMPS					1	1
ENGINE CONTROLS						
THROTTLE-POWER LEVER ASSEMBLIES				16		16
MIXTURE CONTROL ASSEMBLIES				4		4
INDUCTION AIR, PREHEAT CONTROLS				2		2
POWERPLANT-INSTRUMENTS						
POWER INDICATORS					1	1
FUEL PRESSURE GAUGE					1	1
FUEL QUANTITY GAUGE		1	1		19	19
OTHER				1	1	2
MISCELLANEOUS						
POWERPLANT FAILURE FOR UNDETERMINED REASONS	17		17	222		222
BIRD INGESTION				2		2
FOREIGN OBJECT DAMAGE				3	1	4
DETONATION				3		3
OTHER				1		1
REDUCTION GEAR ASSEMBLY						
GEARS, ACCESSORY DRIVE				1		1
SHAFT PROPELLER				1		1

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

POWERPLANT (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
COMPRESSOR ASSEMBLY						
COMBUSTION ASSEMBLY						
OTHER				1		1
TURBINE ASSEMBLY						
VANES, GUIDE				1		1
BLADE, TURBINE WHEEL				4		4
BEARING, SHAFT				1		1
ACCESSORY DRIVE ASSEMBLY						
LUBRICATING SYSTEM						
FUEL SYSTEM						
FUEL CONTROL		1	1	2	1	3
OTHER	2		2	3	2	5
SAFETY SYSTEM						
IGNITION SYSTEM						
OTHER	1		1	1		1
TORQUEMETER						
AIR BLEED						
EXHAUST SYSTEM						
THRUST REVERSER						
PROPELLER SYSTEM						
CONSTANT SPEED DRIVE						
POWER LEVER						
PROPELLER LEVER						
REVERSE THRUST LEVER						
ENGINE INDICATING EQUIPMENT						
ENGINE INSTALLATION						
SUBTOTAL	45	22	67	554	76	630
** SYSTEMS **						
ELECTRICAL SYSTEM						
BATTERIES		1	1	1	2	3
GENERATORS/ALTERNATORS	1		1	3	3	6
RELAYS AND WIRING				5		5
MOTORS				1		1
PROTECTIVE DEVICES				1		1
OTHER				1	4	5
HYDRAULIC SYSTEM						
HYDRAULIC PUMPS				1		1
RESERVOIR, LINES, FITTINGS				5	1	6
SEALS				1		1
OTHER				3		3
FLIGHT CONTROL SYSTEMS						

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FACTOR	TOTAL	ALL ACCIDENTS CAUSE	FACTOR	TOTAL
SYSTEMS (CONTINUED)						
AILERON AND AILERON TAB CONTROL SYSTEM	1		1	6		6
ELEVATOR AND ELEVATOR TAB CONTROL SYSTEM	2		2	5		5
RUDDER AND RUDDER TAB CONTROL SYSTEM				3	1	4
WING FLAP CONTROL SYSTEM (ELECTRICAL)				1		1
FLIGHT CONTROL BOOST SYSTEM (HYDRAULIC)					1	1
OTHER				1		1
ANTI-ICING, DE-ICING SYSTEMS						
WING ANTI-ICING, DE-ICING SYSTEMS				1		1
WINDSHIELD ANTI-ICING, DE-ICING SYSTEMS				1	1	2
CARBURETOR DE-ICING SYSTEM				1	1	2
AIR CONDITION, HEATING AND PRESSURIZATION						
AUTO PILOT						
FIRE WARNING SYSTEM						
FIRE EXTINGUISHER SYSTEM						
OXYGEN SYSTEM						
OTHER SYSTEMS						
PITOT SYSTEM					1	1
VACUUM SYSTEM	1		1	1	1	2
OTHER				2		2
SUBTOTAL	5	1	6	44	16	60
** INSTRUMENTS/EQUIPMENT AND ACCESSORIES **						
FLIGHT AND NAVIGATION INSTRUMENTS						
ALTIMETERS		1	1		1	1
AIRSPEED				1	2	3
ATTITUDE GYRO	2	2	4	2	2	4
DIRECTIONAL GYRO		1	1		2	2
OTHER	1	1	2	1	3	4
COMMUNICATIONS AND NAVIGATION EQUIPMENT						
TRANSMITTERS AND/OR RECEIVERS		1	1		3	3
MISCELLANEOUS EQUIPMENT						
SPRAY, DUSTING EQUIPMENT	1		1	1	1	2
GLIDER LAUNCH/TOW EQUIPMENT				2		2
SUBTOTAL	4	6	10	7	14	21
** ROTORCRAFT **						
ROTOR ASSEMBLIES						
MAIN ROTOR BLADES	2	1	3	2	2	4
TAIL ROTOR BLADES				5		5
UNIVERSAL JOINTS, COUPLINGS				1		1

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

ROTORCRAFT (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FACTOR	TOTAL	ALL ACCIDENTS CAUSE	FACTOR	TOTAL
BEARINGS				1		1
OTHER				1		1
TRANSMISSION ROTOR DRIVE SYSTEM						
ENGINE DRIVE SHAFT	1		1	2		2
MAIN ROTOR GEAR BOX				2		2
MAIN ROTOR PULLEYS, BELTS				1		1
TAIL ROTOR DRIVE SHAFT ASSEMBLY				3		3
TAIL ROTOR GEAR BOX	1	1	2	3	1	4
MAIN ROTOR INTERMEDIATE GEARS				1		1
CLUTCH ASSEMBLY				7		7
OTHER				2		2
FLIGHT CONTROL SYSTEMS						
CYCLIC PITCH CONTROL SYSTEM	1		1	6	1	7
COLLECTIVE PITCH CONTROL SYSTEM				1		1
TAIL ROTOR PITCH CONTROL SYSTEM				2	1	3
MISCELLANEOUS UNITS AND ASSEMBLIES						
TAIL BOOMS/PYLONS/CONES				1		1
OTHER	1		1	2		2
SUBTOTAL	6	2	8	43	5	48
** AIRPORTS/AIRWAYS/FACILITIES **						
AIRPORT FACILITIES						
INSTRUMENT LANDING SYSTEM		1	1		1	1
APPROACH LIGHTING		1	1		1	1
RUNWAY LIGHTING		1	1		10	10
TAXIWAY LIGHTING AND MARKING				1	1	2
OTHER		2	2		2	2
AIRPORT CONDITIONS						
WET RUNWAY		1	1	1	33	34
ICE/SLUSH ON RUNWAY				1	12	13
SNOW ON RUNWAY		1	1	1	15	16
SNOW WINDROWS					15	15
UNMARKED OBSTRUCTIONS				2	3	5
SOFT SHOULDERS (RUNWAY)		1	1		24	24
GLASSY WATER					1	1
HIGH VEGETATION				1	21	22
HIDDEN HAZARD				2	1	3
POORLY MAINTAINED RUNWAY SURFACE		2	2		20	20
SOFT RUNWAY		1	1	1	27	28
WET RAMP/TAXIWAY					1	1
ICE/SLUSH ON RAMP/TAXIWAY					2	2
SNOW ON RAMP/TAXIWAY					3	3

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

AIRPORTS/AIRWAYS/FACILITIES (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS CAUSE	FACTOR	TOTAL	ALL ACCIDENTS CAUSE	FACTOR	TOTAL
SOFT SHOULDERS (RAMP/TAXIWAY)					1	1
POORLY MAINTAINED RAMP/TAXIWAY SURFACE					2	2
OTHER				1	51	52
AIRWAYS FACILITIES						
SUBTOTAL		11	11	11	247	258
** WEATHER **						
LOW CEILING		138	138		189	189
RAIN		56	56		84	84
FOG		100	100		155	155
SNOW	1	25	26	1	50	51
HAIL		1	1	1	1	2
ICING CONDITIONS-INCLUDES SLEET, FREEZING RAIN, ETC		26	26		57	57
CONDITIONS CONDUCIVE TO CARB/INDUCTION SYSTEM ICING		4	4		39	39
UNFAVORABLE WIND CONDITIONS	1	15	16	14	277	291
WIND SHEAR		1	1		11	11
SUDDEN WINDSHIFT		1	1	2	18	20
TURBULENCE IN FLIGHT, CLEAR AIR	1	3	4	3	12	15
TURBULENCE ASSOCIATED WITH CLOUDS AND/OR THUNDERSTORMS	2	22	24	3	25	28
DOWNDRAFTS, UPDRAFTS	1	12	13	12	58	70
LOCAL WHIRLWIND				4	3	7
TORNADO				1		1
SQUALL LINE		1	1	1	1	2
ADVERSE WINDS ALOFT	1	1	2	1	4	5
HIGH TEMPERATURE		3	3		18	18
OBSTRUCTIONS TO VISION		7	7	2	15	17
HIGH DENSITY ALTITUDE		19	19		96	96
THUNDERSTORM ACTIVITY		16	16	2	36	38
OTHER		4	4		12	12
SUBTOTAL	7	455	462	47	1161	1208
** TERRAIN **						
WET, SOFT GROUND				2	116	118
SNOW-COVERED					26	26
ICY					5	5
HIGH VEGETATION		1	1		76	76
HIDDEN OBSTRUCTIONS					10	10
ROUGH/UNEVEN		1	1	8	177	185
ROUGH WATER					3	3
GLASSY WATER		1	1		5	5

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

TERRAIN (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
HIGH OBSTRUCTIONS	1	39	40	6	309	315
LOOSE GRAVEL					4	4
SANDY				1	16	17
OTHER		3	3		33	33
SUBTOTAL	1	45	46	17	780	797
** MISCELLANEOUS **						
BIRD COLLISION	2	1	3	14	1	15
VORTEX TURBULENCE		1	1	7	2	9
PROP/JET/ROTOR BLAST				5		5
ANIMAL(S) ON RUNWAY/TAXIWAY/RAMP	1		1	9	3	12
EVASIVE MANEUVER TO AVOID COLLISION	3		3	42	20	62
UNQUALIFIED PERSON OPERATED AIRCRAFT	3	4	7	17	15	32
SUICIDE	1		1	1		1
FOREIGN OBJECT DAMAGE	1		1	2		2
SMOKE IN COCKPIT		1	1		7	7
FOREIGN MATERIAL AFFECTING NORMAL OPERATIONS	1		1	21	4	25
UNDETERMINED	51		51	85		85
SUBTOTAL	63	7	70	203	52	255
GRAND TOTAL	1039	712	1751	5435	2835	8270
** MISCELLANEOUS ACTS, CONDITIONS **						
ALTIMETER SETTING-INCORRECT		2	2	1	3	4
ANTI-ICING/DEICING EQUIP-IMPROPER OPER. OF/FAILED TO USE	2		2	37		37
CHECKLIST-FAILED TO USE		1	1		7	7
CREW COORDINATION-POOR	1		1	2	5	7
DISREGARD OF GOOD OPERATING PRACTICE		1	1	1	2	3
IMPROPER EMERGENCY PROCEDURES	4		4	18	4	22
GUST LOCKS ENGAGED				3		3
INSTRUMENTS-MISREAD OR FAILED TO READ		1	1	2	1	3
SEAT BELT NOT FASTENED		1	1		1	1
NOT ALLIGNED WITH RUNWAY/INTENDED LANDING AREA		2	2	11	11	22
UNWARRANTED LOW FLYING	29	36	65	43	62	105
FAILED TO USE ALL AVAILABLE RUNWAY		1	1	4	5	9
LANDED AT WRONG AIRPORT					1	1
INATTENTIVE TO FUEL SUPPLY	6		6	57	3	60
FLEW INTO BLIND CANYON	4		4	12	2	14
PREMATURE FLAP RETRACTION		1	1		3	3

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

MISCELLANEOUS ACTS, CONDITIONS (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
POORLY PLANNED APPROACH		1	1		13	13
MISCALCULATED FUEL CONSUMPTION	3		3	29	3	32
JETTISONED LOAD					45	45
STOLEN OR UNAUTHORIZED USE OF AIRCRAFT		11	11		30	30
LANDED ON FOAMED RUNWAY					2	2
IMPROPERLY SECURED	2	1	3	24	3	27
BOGUS PART				1		1
ELECTRICAL FAILURE	1	1	2	4	13	17
ENGINE LOADED UP				5		5
EXPLOSIVE DECOMPRESSION				1		1
FATIGUE FRACTURE	9		9	37		37
FUEL GRADE-IMPROPER		2	2	5	4	9
HYDRAULIC FAILURE				2		2
IMPROPER GRADE OIL-LUBRICATING SYSTEM					1	1
WINDSHIELD, DIRTY, FOGGY, ETC-RESTRICTED VISION				2	13	15
WRONG PART	1		1	8	1	9
IMPROPER ALIGNMENT/ADJUSTMENT		1	1	10	5	15
FAILURE OF TWO OR MORE ENGINES		5	5		17	17
SEPARATION IN FLIGHT		35	35		63	63
FIRE IN CABIN/ COCKPIT/ BAGGAGE COMPARTMENT		1	1	2	6	8
FIRE IN ENGINE		3	3	1	16	17
ASYMETRICAL FLAPS				1		1
LATERAL IMBALANCE	1		1	2		2
CORRODED/CORROSION				8	1	9
INCORRECT TRIM SETTING				4	2	6
PILOT FATIGUE		10	10	1	17	18
FUEL EXHAUSTION	20		20	226		226
FUEL CONTAMINATION-EXCLUSIVE OF WATER IN FUEL	1	2	3	17	4	21
PILOT SUFFERED HEART ATTACK	3		3	3		3
ALCOHOLIC IMPAIRMENT OF EFFICIENCY AND JUDGMENT	20	9	29	26	11	37
HYPOXIA		1	1		1	1
CARBON MONOXIDE POISONING	1	1	2	1	1	2
ICE-IN FUEL				3	1	4
ICE-ENGINE				1		1
ICE-CARBURETOR	2		2	37		37
AIRFRAME ICE	9	7	16	22	15	37
ICE-WINDSHIELD	1		1	3	4	7
IMPROPERLY LOADED AIRCRAFT-WEIGHT-AND/OR CG	3	17	20	15	30	45
INTERFERENCE WITH FLIGHT CONTROLS				8	1	9
WHITEOUT		1	1	2	6	8
SUNGLARE		6	6		19	19
LACK OF LUBRICATION-SPECIFIC PART, NOT SYSTEM	3		3	16		16
OIL EXHAUSTION-ENGINE LUBRICATION SYSTEM	4	1	5	25	1	26
OIL CONTAMINATION					2	2

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

MISCELLANEOUS ACTS, CONDITIONS (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
SIMULATED CONDITIONS	1	1	2	1	26	27
FUEL SIPHONING				7	1	8
WATER IN FUEL	7	1	8	65	3	68
AIRCRAFT CAME TO REST IN WATER		59	59		158	158
FROZEN, MOISTURE				2		2
MISSING	1	1	2	19	2	21
TOUCH AND GO LANDING		5	5		84	84
HYDROPLANING ON WET RUNWAY					2	2
OVERLOAD FAILURE	2	21	23	11	320	331
MATERIAL FAILURE	13	4	17	189	21	210
FUEL STARVATION	13		13	119		119
OIL STARVATION				8		8
IMPROPER CLEARANCE-TOLERANCE				3	1	4
FUEL SELECTOR POSITIONED BETWEEN TANKS	2		2	3	1	4
TIEDOWN LINES SNAPPED					2	2
FIRE OF UNDETERMINED ORIGIN		1	1		11	11
UNAPPROVED MODIFICATION		2	2	1	2	3
IMPROPER/INADEQUATE VENTING				3		3
POOR WELD				2		2
PREVIOUS DAMAGE	2		2	11	2	13
LEAK/LEAKAGE	2	2	4	39	5	44
LOW FLUID LEVEL				4	2	6
CIRCUIT BREAKER POPPED					4	4
ARCING		1	1	1	2	3
LOW COMPRESSION	1	2	3	3	10	13
RUNWAY CLOSED		1	1	1	8	9
DOWNWIND		6	6	2	93	95
CARBON DEPOSITS	1	2	3	6	5	11
LANDED IN CONSTRUCTION AREA				2	1	3
UNDER TORQUED	1		1	1		1
LOOSE, PART FITTING	1	1	2	24	4	28
GROUND RESONANCE				1		1
BENT				5	1	6
BINDING				6	2	8
BUCKLED				1		1
BURNED				3		3
CHAFFED				1	1	2
COLLAPSED				2		2
CROSSED				1		1
DETERIORATED				2	1	3
DISCONNECTED	2		2	29		29
DISTORTED				1		1
ELONGATED				1		1
EXCESSIVE-WEAR/PLAY	1	1	2	24	10	34

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Appendix B -- CAUSE/FACTOR TABLE (Continued)
ALL OPERATIONS
1980

MISCELLANEOUS ACTS, CONDITIONS (CONTINUED)

DETAILED CAUSE/FACTOR	FATAL ACCIDENTS			ALL ACCIDENTS		
	CAUSE	FACTOR	TOTAL	CAUSE	FACTOR	TOTAL
ERRATIC	1	3	4	7	19	26
FLUCTUATING					2	2
FLUTTER	1		1	2		2
FRAYED				1		1
GROUNDED				8	1	9
IMPROPERLY INSTALLED	2		2	23	2	25
JAMMED	1		1	18	1	19
OBSTRUCTED	3		3	28	3	31
OPEN				2	2	4
OUT OF BALANCE				2		2
OVERHEATED	1		1	6		6
PINCHED				1		1
EXCESSIVE PRESSURE				1		1
PRESSURE TOO LOW				1	2	3
PRESSURE, NONE				2		2
SCORED				4		4
SHEARED				8	2	10
STICKING		1	1		1	1
STRIPPED				2		2
STUCK		1	1	5	2	7
EXCESSIVE TEMPERATURE	2		2	3		3
VIBRATION, EXCESSIVE		1	1	5	3	8
WARPED				1		1
FIRE IN WING					2	2
LOAD NOT JETTISONED				1	29	30
INTENTIONAL GROUND-WATER LOOP-SWERVE				14	12	26
INTENTIONAL WHEELS UP				9	5	14
RAN OFF END OF RUNWAY		4	4		147	147

DIRECT ENTRY CAUSES (CARRIED UNDER APPROPRIATE CAUSAL CATEGORIES AND INCLUDED IN THE TOTALS)

MISC-PREMATURE CHUTE OPENING.
MISC-FUEL STARVATION FOR UNDETERMINED REASON
MISC-FUEL STARVATION FOR UNDETERMINED REASON
MISC-OIL EXHAUSTION FOR UNDETERMINED REASON
PILOT-FAILED TO MAINTAIN POSITIVE RATE OF CLIMB.
MISC-FUEL STARVATION FOR UNDETERMINED REASON.
MISC-LONG LINE CABLE POSITIONED OUTSIDE OF SKID
MISC-FUEL STARVATION FOR UNDETERMINED REASONS
MISC-FUEL EXHAUSTION FOR UNDETERMINED REASON
PLT-FAILED TO ESTABLISH POSITIVE RATE OF CLIMB.
PILOT-INADVERTENT PENETRATION OF CLOUDS
PLT-FAILED TO MAINTAIN A POSITIVE RATE OF CLIMB

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Appendix C -- Discussion of the Reporting of a Combined Accident Rate for Personal and Business Flying

The National Transportation Safety Board, in fulfillment of its Federal mandate, investigates, collects and stores data about, and determines the probable cause of all U.S. civil aviation accidents. The Safety Board annually reports to the U.S. Congress and to the public on the status and trend of aviation safety. In the process of collecting, analyzing, and reporting aviation accident data, the Safety Board disaggregates, to the extent possible, the whole of U.S. civil aviation accidents into smaller, more homogeneous subgroups. That is, an attempt is made to separate, out of the entire accident population, those subgroups with similar characteristics. This makes it easier to monitor changes in safety trends and to develop recommendations for safety improvement.

To discern and monitor trends in safety, the Safety Board obtains measures of exposure to risk (exposure data), such as hours flown, miles flown, or number of departures for each of the categories of aviation for which these data are available. The sources which collect these exposure data include the Civil Aeronautics Board (CAB), the Federal Aviation Administration (FAA), and some industry groups or associations (such as the Regional Airline Association). The Safety Board calculates accident rates (the number of accidents per unit of exposure) for each category of aviation for which reliable exposure data are reported and monitors changes in these accident rates (accident rate trends).

The subgroups or categories of aviation accidents monitored by the Safety Board include air carriers operating large transport aircraft under 14 CFR 121, commuter air carriers and on-demand air taxis operating under 14 CFR 135, and general aviation.

The Safety Board historically has divided general aviation accidents into a very large number of categories. For most of these individual categories, no exposure data are available in any form. However, the FAA collects exposure data for five subgroups of general aviation which are reasonably compatible with certain NTSB categories of flying:

- Instructional
- Corporate/executive
- Aerial application
- Personal
- Business

The Safety Board historically has reported accident rates for air carrier and these general aviation categories based on two assumptions: that exposure data were valid, and that the homogeneity of characteristics thought to be related to levels of safety is greater within these subgroups than within aviation as a whole.

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The characteristics thought to be related to levels of safety include:

--FAA operating rules (14 CFR 121, 135, 91, 133, 137, etc.)

--Maintenance levels of aircraft

--Types of operations performed (operating from "good" airports or rough strips; carrying external loads; crop dusting; pleasure flying; practice flying)

--Experience level of pilot (certificate level; total flight experience; flight hours in type of aircraft; flight hours in a recent period--i.e., how often pilot flies)

--Type of aircraft and how equipped

It is assumed that: the more stringent the FAA operating rules; the higher the level of maintenance; the better the conditions of the landing environment; the more powerful and better equipped the aircraft; and the greater the experience level and proficiency of the pilot, the lower the accident rate will be. Thus, one expects air carriers operating under 14 CFR 121 to have the lowest accident rate, followed by commuter carriers operating scheduled flights under 14 CFR 135; one expects that the highest accident rates would be experienced by the category of aviation involving the most difficult operations, or least experienced pilots, or least sophisticated equipment, or the most difficult environments (for example, aerial applications or external load operations.) This hypothesis in fact is supported by the accident rates calculated using accidents investigated and classified by the Board and those exposure data whose validity the Board accepts, collected by the CAB and the FAA.

Several corollaries follow: (1) categories of flying with similar characteristics and conditions have similar accident rates; (2) those with similar accident rates have similar characteristics; and (3) flying categories with dissimilar accident rates are associated with dissimilar characteristics or factors.

The historical accident rates for "business" and "personal" flying, calculated using the exposure data reported by aircraft owners to the FAA, are very dissimilar. For example, the 1980 rate for "personal" flying is seven times greater than that for "business" flying. Therefore, assuming the validity of the third corollary above, the characteristics of the pilots, aircraft, and environments in these flying categories should also be very dissimilar. On the other hand, assuming the validity of the second corollary above, the characteristics of pilots, aircraft, and environments of "business" flying should be fairly similar to those of "air taxi" and "corporate/executive" flying, since the accident rates of these categories are fairly similar.

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However, analysis of the pilot and aircraft characteristics for which data are available in the NTSB aviation accident database shows that the characteristics of "business" flying are more similar to those of "personal" flying than they are to those of "air taxi" or "corporate/executive" flying. (*) Therefore, assuming the validity of the first corollary above, the accident rate of "business" flying should be more similar to that of "personal" flying than to that of "air taxi" or "corporate/executive." Since that is not confirmed by the calculations of "business" flight accident rates and "personal" flight accident rates, either the number of accidents in the "business" and/or the "personal" categories is incorrect or the number of flight hours in either or both of these categories is wrong.

For a number of reasons, the Safety Board has high confidence in the accuracy of its classification of accidents as "business" or "personal". During the course of its investigation of accidents, the Safety Board has the opportunity to check the aircraft at the scene, review the flight logs and the operations specifications (if an air carrier is involved), talk to the pilot(s) and to witnesses. On the basis of this range of information, the Board can determine the purpose for which an aircraft was being flown at the time of the accident and so classify it.

On the other hand, the exposure data (hours flown data) collected by the FAA are obtained through a mail survey of aircraft owners. A one-page form is sent to some 30,000 to 35,000 owners of aircraft, who are asked to fill out a section of the form stating the primary (and sometimes the secondary) purpose(s) for which the aircraft was used during the previous year and the number of hours flown for that purpose. Although the FAA performs the normal tests to determine the extent of sampling errors on these survey returns, there is no reasonable way to check on the content validity of the data. As a matter of fact in August 1981 the NTSB and the FAA agreed on a revised list of general aviation aircraft use. A study document prepared by the FAA in that connection states the following in defining a new category, "Business Transportation/Personal" flying:

(*) It must be borne in mind that these are data about accident-involved pilots, aircraft, and environments. These data may not be representative of those of non-accident-involved pilots, aircraft, and environments in the same flying categories. However, we believe it is reasonable to postulate: that any possible biases in the characteristics introduced by the use of accident data are not likely to affect the result; and that the characteristics of "business" flying are somewhat more similar to those of "personal" flying than to those of "air taxi" or to those of "corporate/executive" flying.

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Business Transportation/Personal - any use of an aircraft by individuals for the purpose of transportation required by the business in which they are engaged or for personal purposes. This is a combination of the two old FAA categories, personal and business. They should be combined because in a lot of cases it is hard to distinguish between them. Approximately the same kinds of aircraft are used and the hours are being flown by nonprofessional pilots. In addition, there are the obvious tax advantages of an owner being able to claim the aircraft as a business expense. This will eliminate the suspected overestimate of business hours and concomitant underestimate of personal hours.

In any case, regardless of whether it is the number of accidents in the "business" and/or the "personal" categories that is incorrect or the number of flight hours in either or both of these categories, disaggregation of "business" and "personal" accident rates, based on such inaccurate data, would be misleading.

The arguments presented above are not a categorical determination that the flight hour data for "business" and "personal" are flawed. However, the use of these flight hours results in anomalies which raise such serious doubts about the validity of the data that the Board is unwilling to use the flight hour estimates to make an official determination of accident rates.

As stated previously, the Safety Board is confident of its ability to determine the purpose for which the aircraft was being used at the time of an accident; it has not been able to develop a reliable method of obtaining flight hour data allocated to "business" and "personal" flying. Accordingly while it is appropriate to continue to report separately the number of accidents in the "business" and "personal" categories of flying, the Board will discontinue its past practice of reporting separate accident rates for the two categories.

*U.S. GOVERNMENT PRINTING OFFICE : 1984 0-421-828/78

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